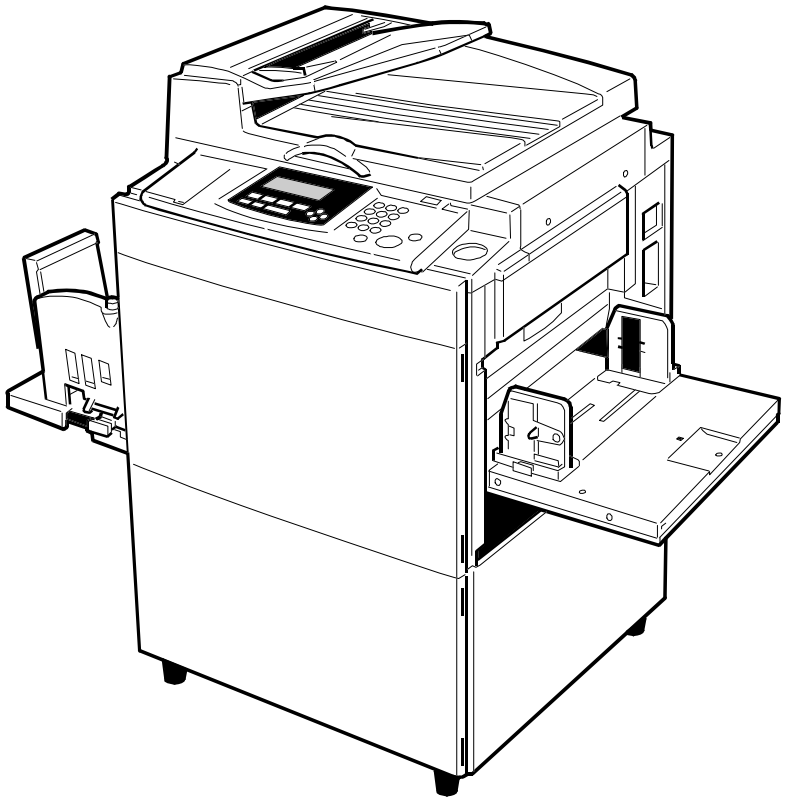
SERVICE MANUAL

(Machine code: C229)



IMPORTANT SAFETY NOTICES

PREVENTION OF PHYSICAL INJURY

1. Before disassembling or assembling parts of the printer and peripherals, make sure that the power cord is unplugged.
2. The wall outlet should be near the printer and easily accessible.
3. If any adjustment or operation check has to be made with exterior covers off or open while the main switch is turned on, keep hands away from electrified or mechanically driven components.

HEALTH SAFETY CONDITIONS

1. If you get ink in your eyes by accident, try to remove it with eye drops or flush with water as first aid. If unsuccessful, get medical attention.
2. If you ingest ink by accident, induce vomiting by sticking a finger down your throat or by giving soapy or strong salty water to drink.

OBSERVANCE OF ELECTRICAL SAFETY STANDARDS

1. The printer and its peripherals must be installed and maintained by a customer service representative who has completed the training course on those models.

⚠CAUTION

The RAM has a lithium battery which can explode if handled incorrectly. Replace only with the same type of RAM. Do not recharge or burn this battery. Used RAM's must be handled in accordance with local regulations.

⚠ATTENTION

La carte RAM comporte une pile au lithium qui présente un risque d'explosion en cas de mauvaise manipulation. Remplacer la pile uniquement par une carte RAM identique. Ne pas recharger ni brûler cette pile. Les cartes RAM usagées doivent être éliminées conformément aux réglementations locales.

SAFETY AND ECOLOGICAL NOTES FOR DISPOSAL

1. Dispose of replaced parts in accordance with local regulations.
2. Used ink and masters should be disposed of in an environmentally safe manner and in accordance with local regulations.
3. When keeping used lithium batteries (from the main processing units) in order to dispose of them later, do not store more than 100 batteries (from the main processing units) per sealed box. Storing larger numbers or not sealing them apart may lead to chemical reactions and heat build-up.

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1. OVERALL INFORMATION

1.1 SPECIFICATIONS

Configuration:	Desktop
Master Processing:	Digital with 400 dpi thermal head
Scanning (Pixel Density):	400 dpi CCD
Printing Process:	Fully automatic stencil system, with one drum and pressure cylinder system
Original Type:	Sheet/Book
In Platen Mode:	Document size: Maximum 304.8 x 432 mm [12.0" x 17.0"] Thickness: Less than 30 mm Weight: Less than 10 kg
In ADF Mode:	Document size: Maximum 297 x 864 mm [11.6" x 33.8"] Minimum 105 x 128 mm [4.2" x 5.1"] Document weight: 52.3 - 104.7 g/m^2 [14 - 28 lb] ADF capacity: 30 sheets (using 20 lb or 80 g/m^2 paper)

Reproduction Ratios:

	Inch versions	Others
Full Size:	100%	100%
Reduction:	65%	71%
	74%	82%
	77%	87%
	93%	93%
Enlargement:	121%	115%
	129%	122%
	155%	141%

Zoom: 50 - 200% (by 1%) in Platen mode
50 - 155% (by 1%) in ADF mode

Directional Magnification:
50 - 200% (by 1%)

Image Modes: Letter, Photo, Letter/Photo, Pencil, Tint

Printing Area: (At 20 °C/ 65 % RH)	Metric size version models: 290 mm x 409 mm Inch size version models: 290 mm x 419 mm [11.4" x 16.4"] With optional A4 drum: 290 mm x 204 mm [11.4" x 8.0"]
Edge Margins:	Leading edge: 10 mm (At the "0" position of Image Shift mode) Trailing edge: 2 mm
Print Paper Size:	Minimum: 70 mm x 148 mm [2.8" x 5.9"] Maximum: 325 mm x 447 mm [12.7" x 17.6"]
Print Paper Weight:	47.1 g/m^2 to 209.3 g/m^2 [12.5 lb to 55.6 lb]
Printing Speed:	60, 75, 90, 105, 120 sheets/minute (5 steps)
Master Process Time:	Platen mode: Less than 15.5 seconds (A3 paper) Less than 12 seconds (A4 paper) ADF mode: Less than 19.5 seconds (A3 paper) Less than 16 seconds (A4 paper)
Master Eject Box Capacity:	60 masters / A3 size (Normal conditions)
Side Registration Adjustable Range:	± 10 mm
Vertical Registration Adjustable Range:	Inch size version models: ± 10 mm Metric size version models: ± 15 mm
Paper Feed Table Capacity:	1000 sheets (80 g/m^2 / 20 lb)
Paper Delivery Table Capacity:	1000 sheets (80 g/m^2 / 20 lb)
Power Source:	110/120 V, 50/60 Hz: 2.7 A 220 - 240 V, 50/60 Hz: 1.5 A
Maximum Power Consumption:	110/120 V version: 285 W 220 - 240 V version: 280 W

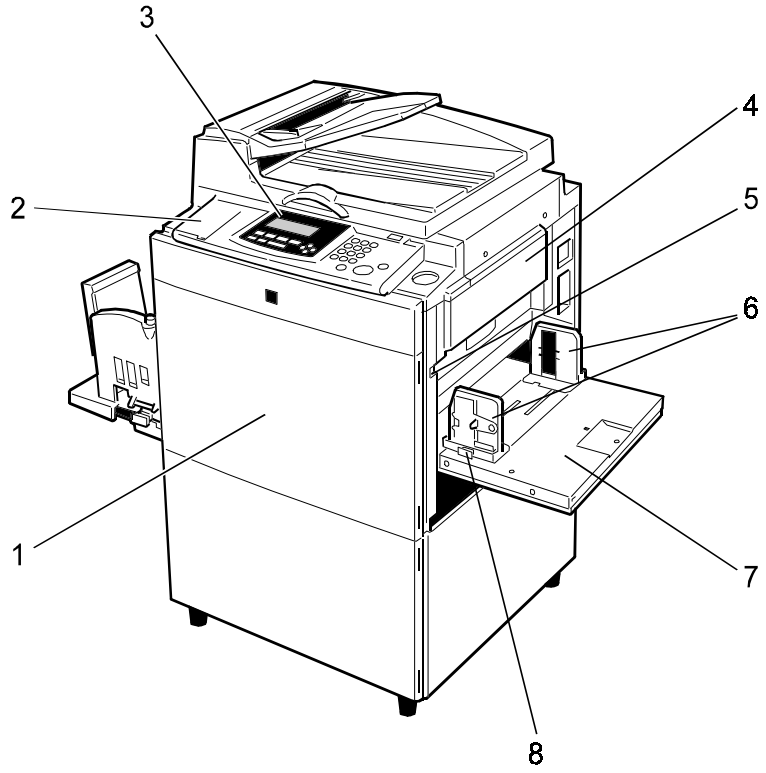
Noise Emission: (At operation position)	At 60 rpm printing speed: 57 dB At 90 rpm printing speed: 60 dB At 120 rpm printing speed: 64 dB
Weight:	94 kg [207 lb] 101 kg [222.7 lb] with ADF
Dimensions: (Width x Depth x Height)	Trays closed: 625 mm x 650 mm x 574 mm With ADF: 625 mm x 650 mm x 684 mm Trays open: 1405 mm x 650 mm x 574 mm With ADF: 1405 mm x 650 mm x 684 mm
Master Type:	Thermal master roll type: 420 mm width, 110 m / roll Yield: 200 masters/roll (at A3 size) Max run length per master: 2,000 prints
Master Storage Conditions:	Temperature: -10 °C to 40 °C Humidity: 10% to 95% RH Recommended maximum storage period: One year after production date * Avoid locations exposed to direct sunlight.
Ink Type	1000 ml cartridge type Available colors: Black, Red, Blue, Green, Brown
Ink Storage Conditions:	Temperature: -5 °C to 40 °C (Optimum conditions: 15 °C to 25 °C) Humidity: 10% to 95% RH (Optimum conditions: 20% to 70% RH) Recommended maximum storage period: One year after production date * Avoid locations exposed to direct sunlight.

Available Options

- A3 Drum
- A4 Drum
- Document Feeder
- Key Counter
- Memory Board (Editing Function)
- PC Controller
- Interface Board (Standard for the U.S.A and European versions)

1.2 GUIDE TO COMPONENTS AND THEIR FUNCTION

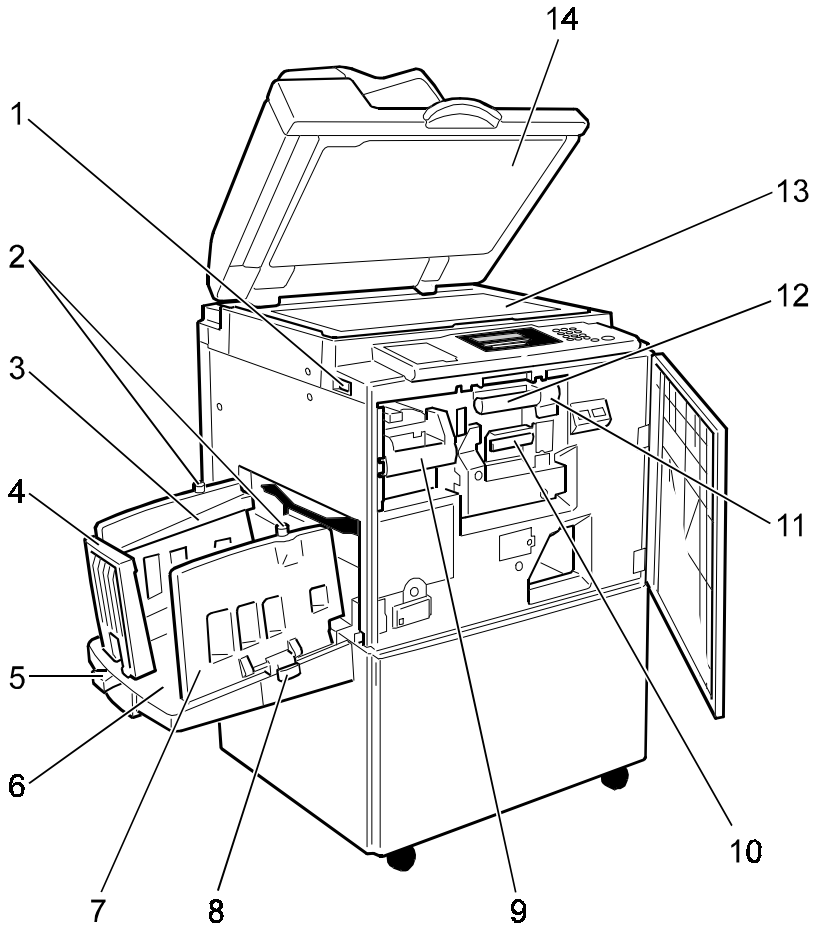
1.2.1 MACHINE EXTERIOR

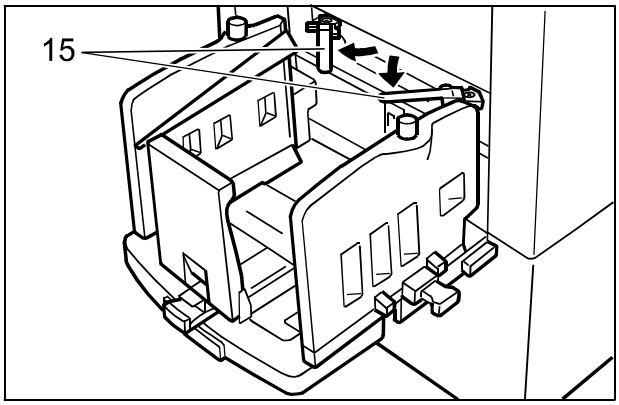


C229V500.WMF

1.	**Front Door**	Open for access to the inside of the machine.
2.	**Flip-up Cover**	Open to access the Image Density key and so on.
3.	**Operation Panel**	Operator controls and indicators are located here.
4.	**Master Feed Unit**	Open the master feed unit when installing the master.
5.	**Paper Feed Tray Down key**	Press to lower the paper feed tray.
6.	**Paper Feed Side/End Plates**	Use to prevent paper skew.
7.	**Paper Feed Tray**	Set paper on this tray for printing.
8.	**Paper Feed Side/End Plate Knob**	Use to move the side/end plates.

1.3 MACHINE INTERIOR

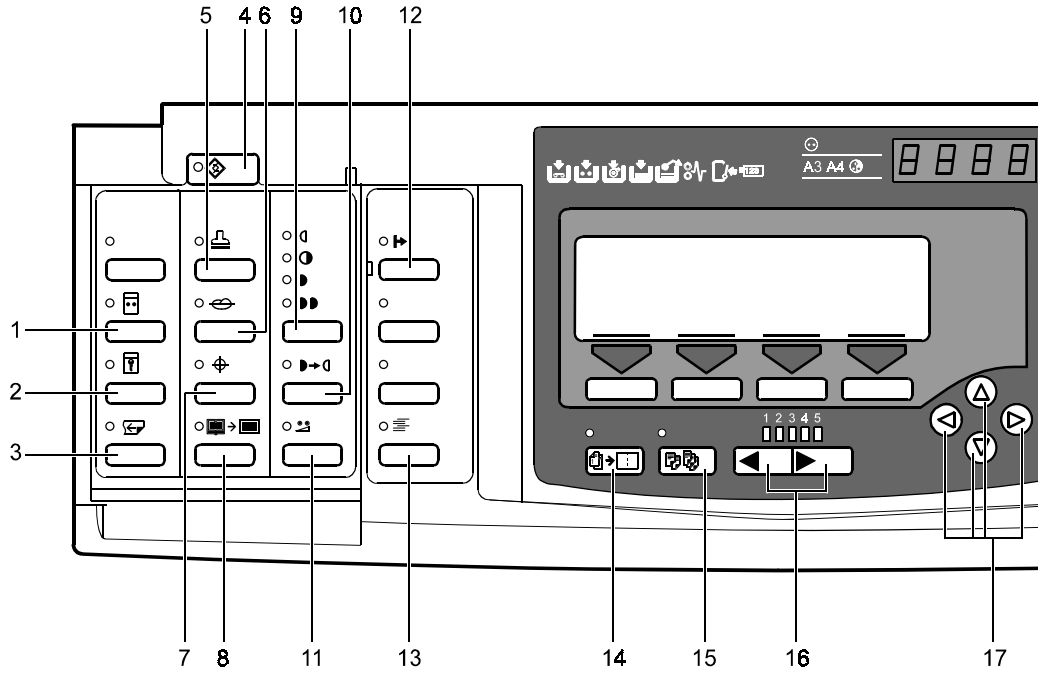




C229V501.WMF

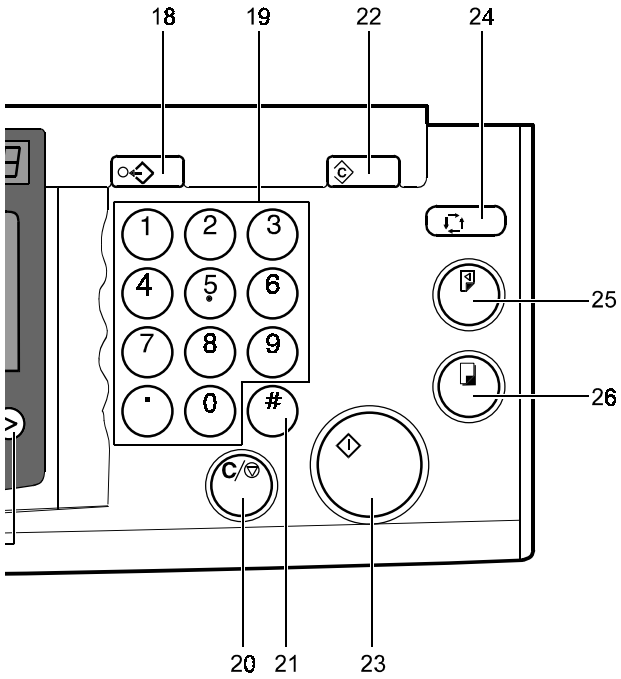
1. Main Switch	Use to turn the power on or off.
2. Paper Alignment Wing Knobs	Use to lift or lower the paper alignment wings.
3. Paper Alignment Wings	Lift or lower the wings depending on the paper type you use.
4. Paper Delivery End Plate	This plate aligns the leading edge of prints.
5. Paper Delivery End Plate Knob	Use to move the end plate.
6. Paper Delivery Tray	Completed prints are delivered here.
7. Paper Delivery Side Plates	These plates align the prints on the paper delivery tray.
8. Paper Delivery Side Plate Knobs	Use to move the side plates.
9. Master Eject Unit Front Handle E1	Use to pull out the master eject unit.
10. Ink Holder	Set the ink cartridge in this holder.
11. Drum Unit Lock Lever B1	Lower to unlock and pull out the drum unit.
12. Drum Unit	The master is wrapped around this unit.
13. Exposure Glass (Contact Glass)	Position originals here face down for printing.
14. Platen Cover	Lower this cover over an original before printing.
15. Trailing Edge Guides	Swing out these guides when you use A4, 8 1/2" x 11" sideways, or B5 lengthwise paper.

1.3.1 OPERATION PANEL



C229V502.WMF

1. **Quality Start key**
2. **Security key**
3. **Skip Feed key**
4. **User Tools key**
   Press to change the default settings and conditions to meet your requirements.
5. **Stamp key**
6. **Make-up key**
7. **Overlay key**
8. **Edge Erase key**
9. **Image Density key**
   Press to make prints darker or lighter.
10. **Tint key**
11. **Economy Mode key**
12. **On Line key**
13. **Job Separator key**
14. **Combine key**
    Press to combine originals onto one print.
15. **Class key**
    Press to select All Class, Auto Class, Manual Class, or Class mode.
16. **Speed keys**
17. **Scroll keys**
    Press to shift the image forward, backward, right, or left.



C229V502.WMF

18. Program key
Press to input or recall user programs.

19. Number keys

20. Clear/Stop key
While printing, press to stop the machine.

21. Enter key
Use to enter data in selected modes.

22. Clear Modes key
Press to clear the previously entered job settings.

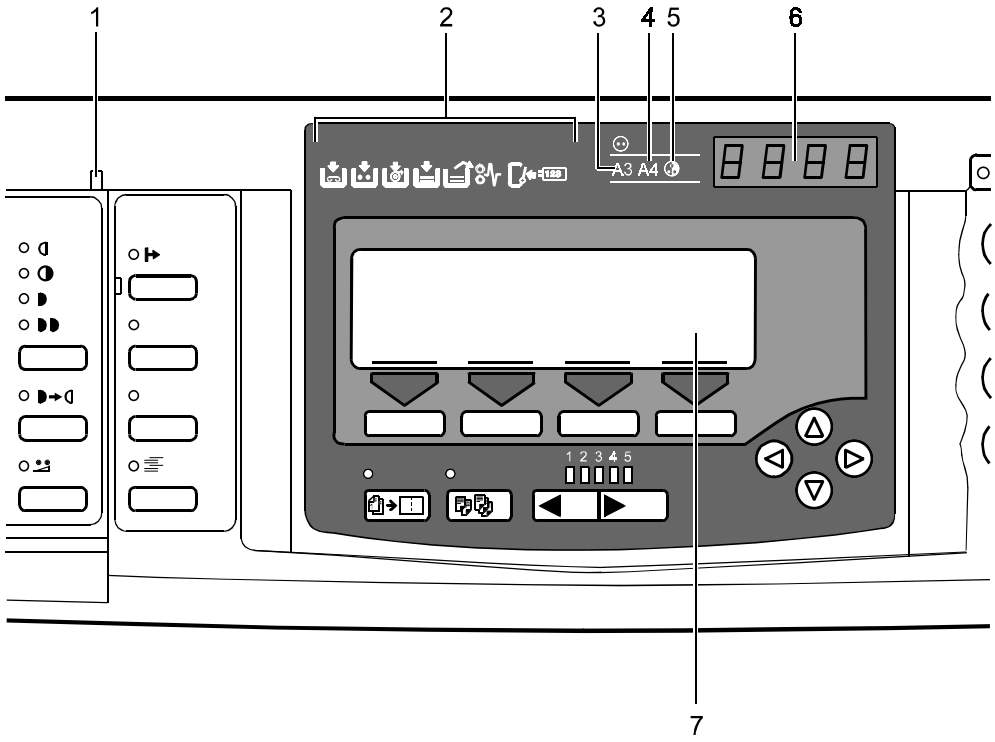
23. Start key
Press to make a master.

24. Auto Cycle key
Use to process the master and make prints at one stroke.

25. Proof key
Press to make a proof print.

26. Print key
Press to start printing.

1.3.2 INDICATORS



C229V503.WMF

1. Special Feature indicator

This indicator is lit when you press keys under the flip-up cover.

2. Monitors

The monitors light up when a non-standard condition occurs within the machine.

3. A3/11" x 17" Drum indicator

This indicator is lit when the A3, 11" x 17" drum unit is installed.

4. A4/81/2" x 11" Drum indicator

This indicator is lit when the A4, 81/2" x 11" drum unit is installed.

5. Color Drum indicator

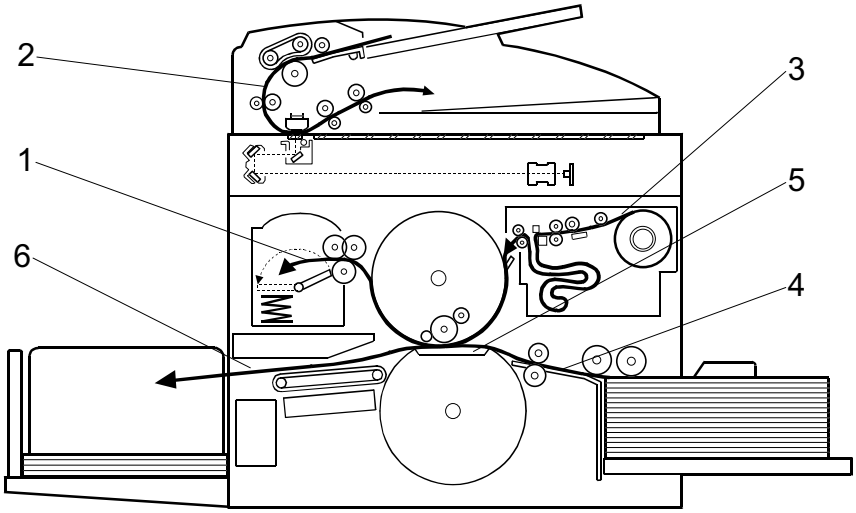
This indicator is lit when the color drum unit is installed.

6. Counter

Displays the number of prints entered. While printing, it shows the number of prints remaining.

7. Panel Display

1.4 PRINTING PROCESS OVERVIEW



C229V008.WMF

1. Master Ejecting: Ejects the used master wrapped around the drum into the master eject box.

↓

2. Scanning: Scans the original image with the CCD through the mirrors and the lens.

↓

3. Master Feeding: Converts the image signal read by the CCD into digital signals and sends them to the thermal head to develop the image on the master. The master then wraps around the drum.

↓

4. Paper Feeding: Sends paper to the drum section.

↓

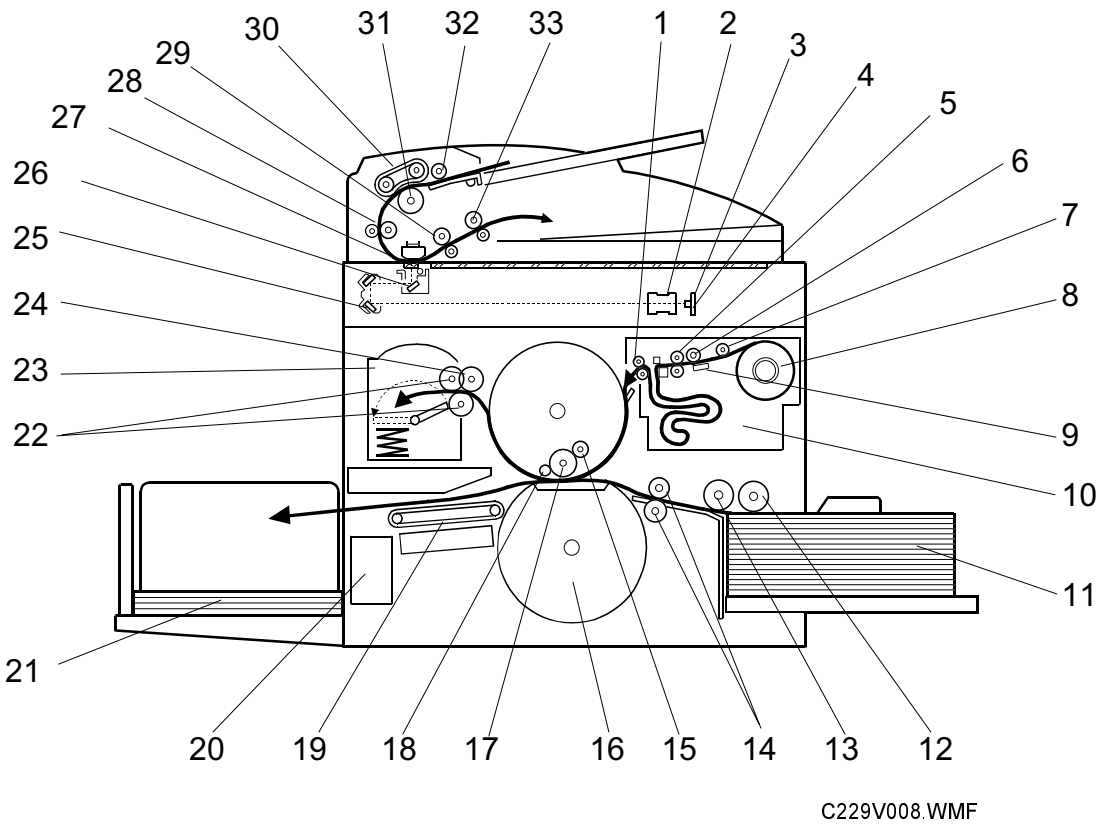
5. Printing: Presses the paper fed from the paper feed section against the drum. This transfers ink to the paper through the drum screen and the master.

↓

6. Paper Delivering: Peels off the printed paper with the exit pawls and air knife, and ejects the paper onto the paper delivery table.

NOTE: Some parts of the master eject, scanning, and master feeding processes are carried out at the same time. Paper feeding also starts before the master feeding process has finished.

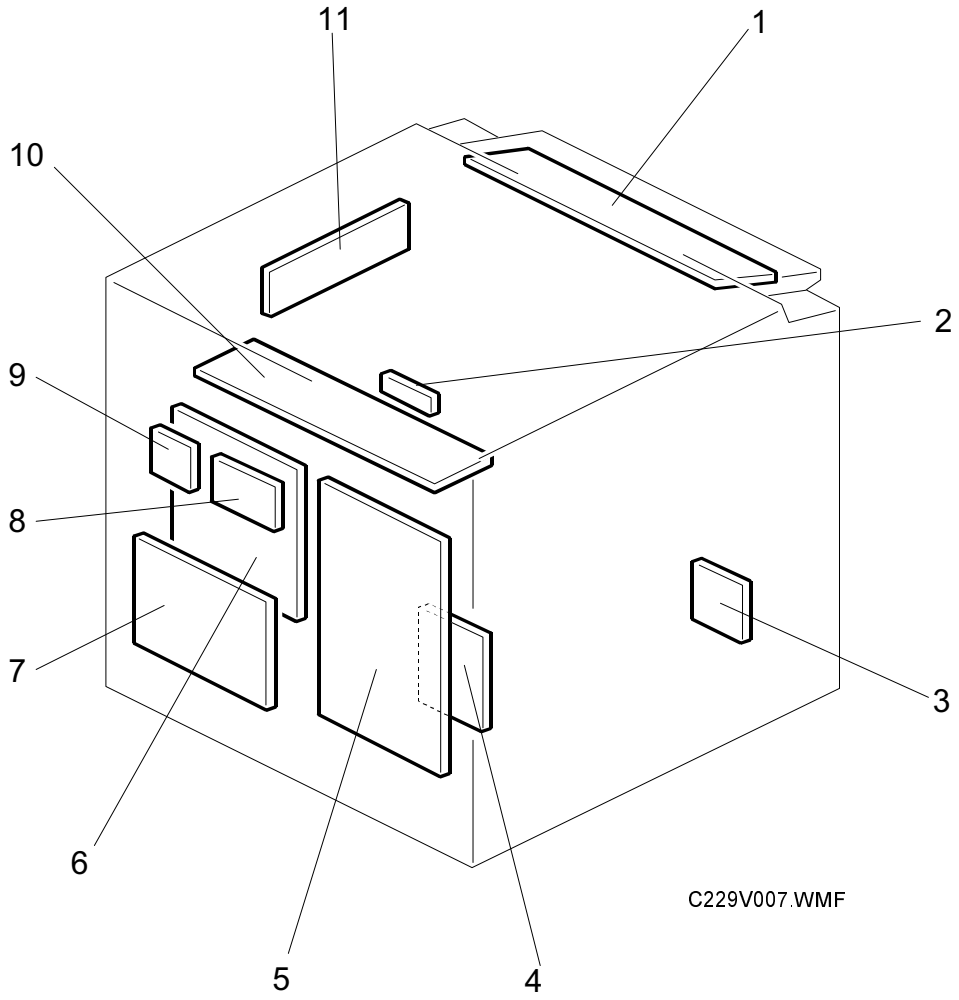
1.5 MECHANICAL COMPONENT LAYOUT



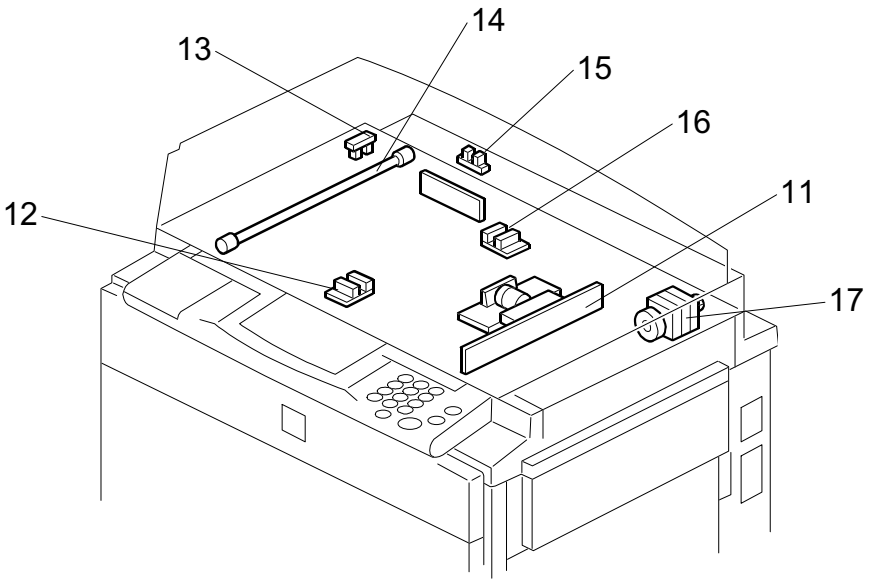
1. Master Feed Control Roller
2. Lens
3. CCD
4. SBU
5. Tension Roller
6. Platen Roller
7. Master Set Roller
8. Master Roll
9. Thermal Head
10. Master Buffer Duct
11. Paper Table
12. Paper Feed Roller
13. Paper Separation Roller
14. Registration Rollers
15. Doctor Roller
16. Pressure Cylinder
17. Ink Roller
18. Idling Roller
19. Transport Belts
20. Job Separator Unit
21. Paper Delivery Table
22. Master Eject Rollers
23. Master Eject Box
24. Master Pick-up Roller
25. 2nd Scanner
26. 1st Scanner
27. DF Exposure Glass
28. 1st Transport Roller
29. 2nd Transport Roller
30. Original Feed Belt
31. Separation Roller
32. Pick-up Roller
33. Original Exit Roller

1.6 ELECTRICAL COMPONENT LAYOUT

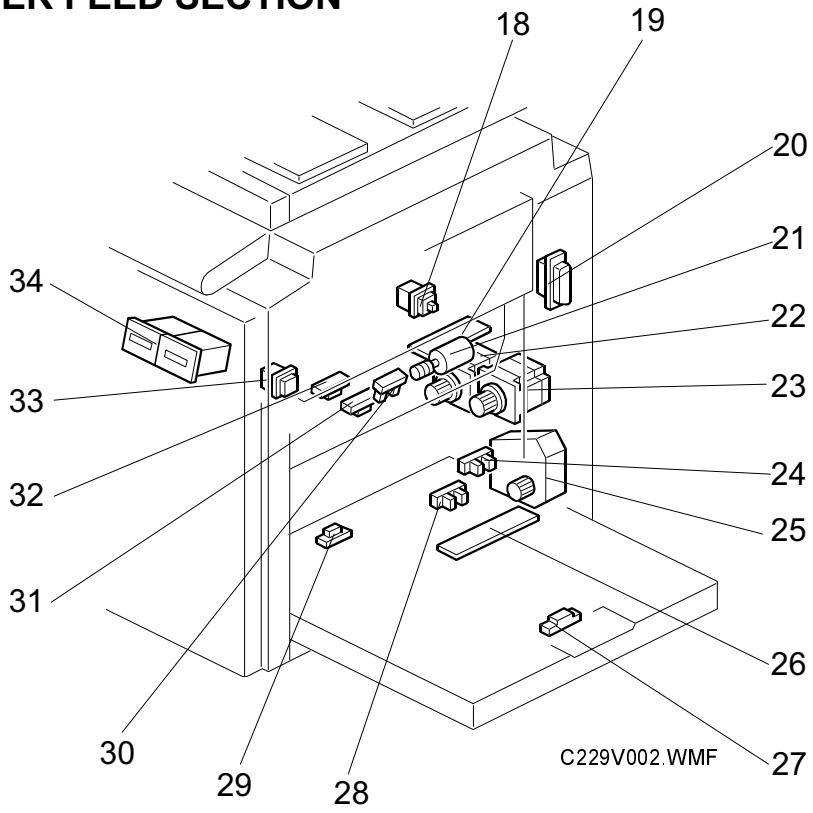
1.6.1 PRINTED CIRCUIT BOARD LAYOUT



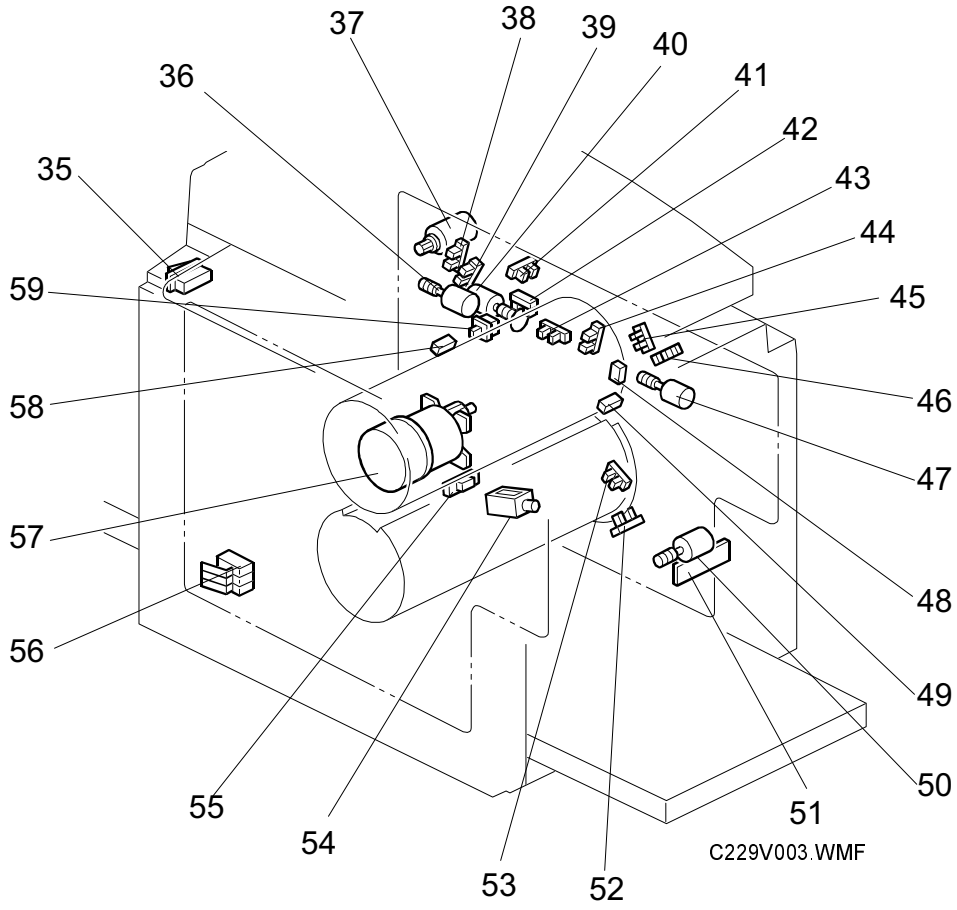
1.6.2 SCANNER SECTION



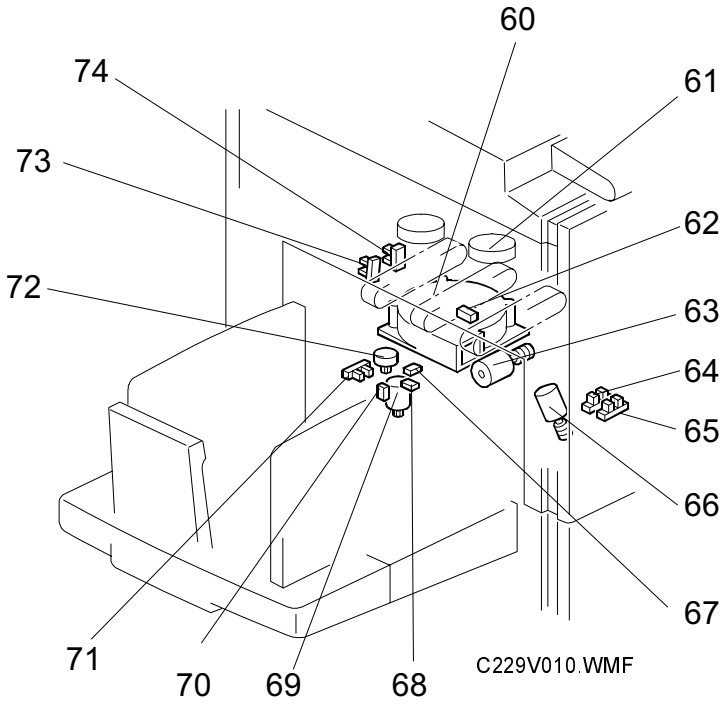
1.6.3 PAPER FEED SECTION



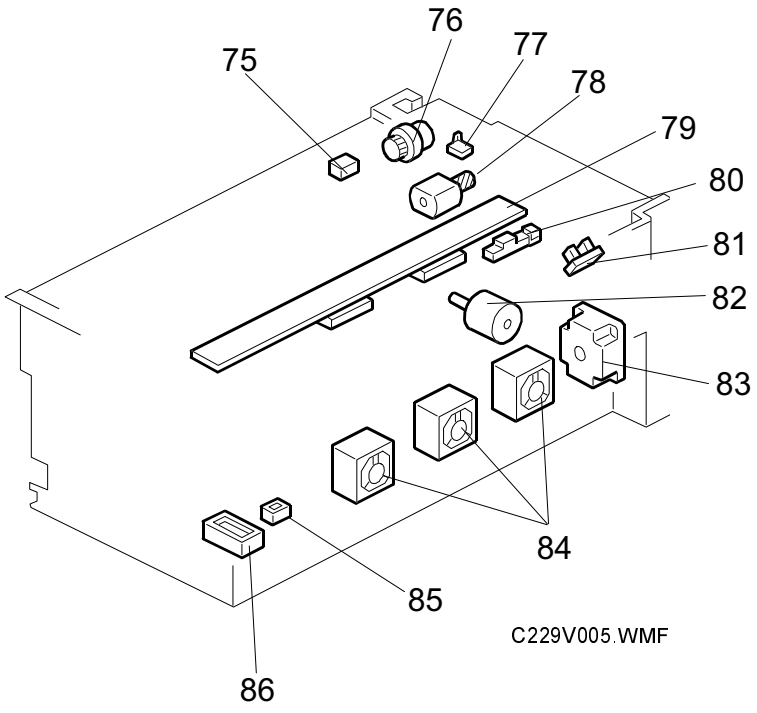
1.6.4 MASTER EJECT, PRESSURE CYLINDER, AND OTHER SECTIONS



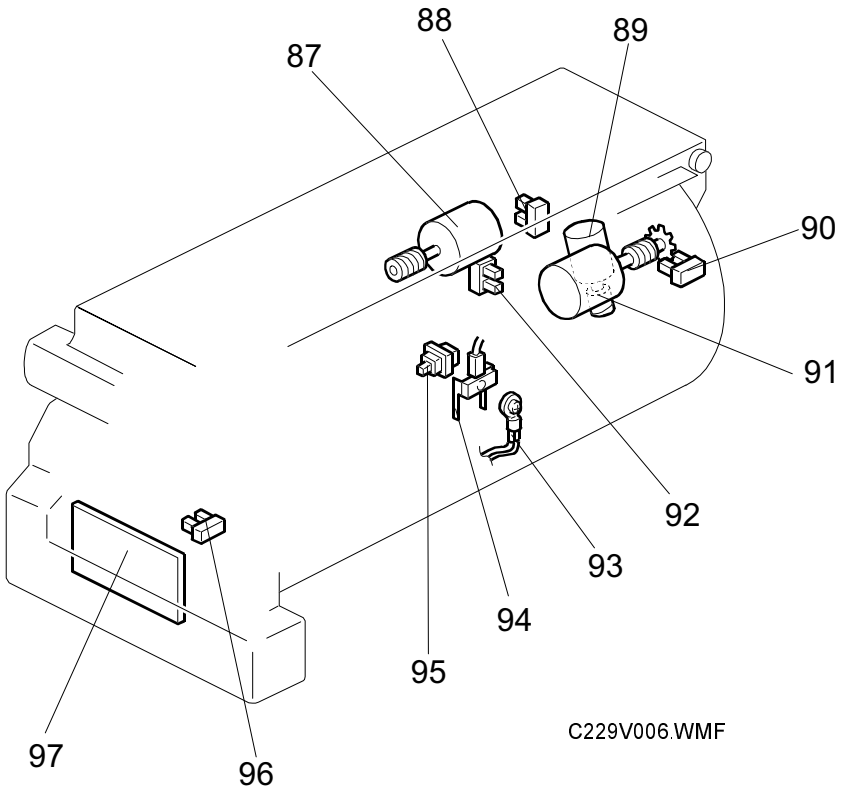
1.6.5 PAPER DELIVERY SECTION



1.6.6 MASTER MAKING UNIT



1.6.7 DRUM UNIT



1.6.8 TABLES OF ELECTRICAL COMPONENTS

Boards

Index No.	Name	Function
1	Operation Panel Board	Controls the operation panel.
2	Lamp Stabilizer	Provides dc power for the xenon lamp.
3	Job Separator Board	Controls the job separator.
4	Main Motor Control Board	Controls the main motor.
5	Power Supply Unit (PSU)	Provides dc power to the system.
6	Main Processing Unit (MPU)	Controls all machine functions both directly and through other boards.
7	I/O Board	Controls the mechanical components.
8	Memory Board	Enables the image editing function and data printout via SP mode. This is an option.
9	Interface Board	Enables the connection with the PC controller. This is an option for the China and Ricoh Asia versions.
10	Thermal Head Power Supply Board	Provides dc power to the thermal head.
11	Sensor Board Unit (SBU)	Contains the CCD, and outputs a video signal to the MPU.
19	Feed Pressure Detection Board	Sends data about the paper feed pressure to the CPU.
26	Paper Width Detection Board	Sends data about the paper width on the paper table to the CPU.
51	Separation Pressure Detection Board	Sends data about the paper separation pressure to the CPU.
97	Ink Detection Board	Checks if there is ink in the drum.

Solenoids

Index No.	Name	Function
54	Printing Pressure Release Solenoid	There are two solenoids: one at the front and one at the rear. They pull the release arms to apply the printing pressure against the drum.
86	Duct Entrance Solenoid	Opens or closes the plate at the entrance of the master buffer duct.

Switches

Index No.	Name	Function
33	Paper Table Lowering Switch	Lowers the paper table.
35	Main Switch	Turns the power on or off.
56	Cover Safety Switches	Checks if the front door is set correctly.

Motors

Index No.	Name	Function
17	Scanner Drive Motor	Drives the scanner.
21	Feed Pressure Motor	Drives the paper feed pressure adjustment mechanism.
22	Registration Motor	Feeds the paper to align it with the image on the master on the drum.
23	Paper Feed Motor	Feeds the paper from the paper table.
25	Paper Table Motor	Raises and lowers the paper table.
36	Pressure Plate Motor	Raises and lowers the pressure plate in the master eject box.
37	Master Eject Motor	Sends used masters into the master eject box.
40	Image Shift Motor	Makes a phase difference between the positions of the drum and pressure cylinder for the up/down image shifting mode.
47	Clamper Motor	Opens or closes the drum master clamper.
50	Separation Pressure Motor	Drives the paper separation pressure adjustment mechanism.
57	Main Motor	Drives the drum, pressure cylinder, and paper delivery unit components.
60	Transport Vacuum Fan	Provides suction so that paper is held firmly on the transport belts.
61	Air Knife Fan	Provides air to separate the paper leading edge from the drum.
63	Wing Guide Motor	Changes the position of the paper wing guides in the paper delivery unit.
66	Pressure Cam Shift Motor	Switches the cams for the small master and full size master to apply the appropriate printing pressure.
69	Slider Lift Motor	Moves the sliding arm in the job separator unit up or down.
72	Job Separator Motor	Drives the sliding arm in the job separator unit.
78	Cutter Motor	Cuts the master after completing the master making.
82	Platen Release Motor	Applies or releases the pressure between the platen roller and the thermal head.
83	Master Feed Motor	Feeds the master to the drum.
84	Master Vacuum Fan	Provides suction to guide the master into the buffer duct.
87	Ink Pump Motor	Drives the ink pump to supply ink.
89	Idling Roller Motor	Presses or releases the idling roller against the drum screen.
91	Drum Shift Motor	Slides the drum screen position to the front or rear for the side-to-side image shifting mode.

Sensors

Index No.	Name	Function
12	Original Width Sensor	Detects the width of the original on the exposure glass.
13	Scanner HP Sensor	Detects when the scanner is at home position.
15	Platen Cover Sensor	Detects if the platen cover is open or closed.
16	Original Length Sensor	Detects the length of the original on the exposure glass.
18	Master Making Unit Set Sensor	Checks if the master making unit is set.
24	Paper Table Lower Limit Sensor	Detects when the paper table is at its lower limit position.
27	Paper Length Sensor	Detects when long paper is on the paper table.
28	Paper Table Set Sensor	Detects if the paper table is closed.
29	Paper End Sensor	Detects if paper is present on the paper table.
30	Paper Height Sensor	Detects if the top of the paper stack on the paper table is at the paper feed height.
31	Paper Registration Sensor	Detects paper approaching the registration roller.
32	Paper Feed Timing Sensor	Detects paper approaching the paper clamper in the pressure cylinder.
38	Pressure Plate HP Sensor	Detects when the pressure plate is at the home position.
39	Pressure Plate Limit Position Sensor	Detects when the pressure plate is at the lowest position.
41	Image Shift HP Sensor	Detects if the pressure cylinder is at the home position. (The up/down image shift is 0.)
42	Image Position Encoder	Sends the image position data to the CPU for display on the operation panel.
43	2nd Drum Position Sensor	Checks the drum position.
44	1st Drum Position Sensor	Checks the drum position.
45	Clamper Close Position Sensor	Detects when the clamper is in the closed position.
46	Clamper Open Position Sensor	Detects when the clamper is in the open position.
48	2nd Drum Master Sensor	Detects if there is a master on the drum, to detect master clamping errors.
49	1st Drum Master Sensor	Detects if there is a master on the drum when the Start key is pressed.
52	Feed Encoder	Detects fluctuations in the pressure cylinder rotation.
53	Feed Start Sensor	Checks the pressure cylinder position for the paper feed start timing.
55	Lower Wrapping Jam Sensor	Detects paper wrapping jams on the pressure cylinder.
58	Master Eject Sensor	Detects master eject misfeeds.
59	Eject Box Set Sensor	Checks if the master eject box is installed.

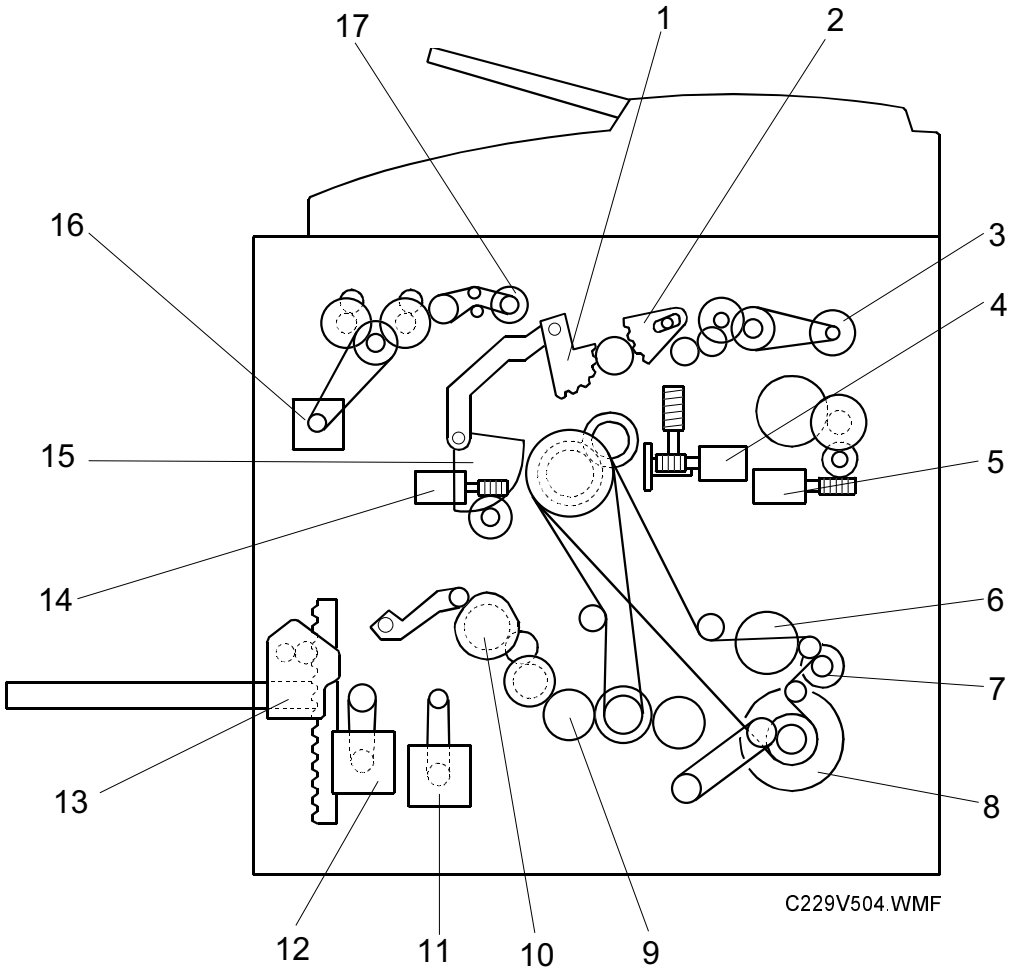
Index No.	Name	Function
62	Paper Exit Sensor	Detects paper misfeeds at the exit.
64	A3 Cam Sensor	Detects when the A3 printing pressure cam is used.
65	A4 Cam Sensor	Detects when the A4 printing pressure cam is used.
67	Slider Position Sensor	Detects when the job separator slider is fully moved toward the paper on the delivery table.
68	Slider HP Sensor	Detects when the job separator slider is at the home position.
70	Paper Sensor	Detects when the job separator slider touches the paper on the delivery table.
71	Slider Upper Limit Sensor	Detects when the job separator slider is at the uppermost position.
73	Wing Upper Position Sensor	Detects when the paper wing guides are in the upper position.
74	Wing Lower Position Sensor	Detects when the paper wing guides are in the lower position.
75	Master Edge Sensor	Detects the leading edge of the master when a new master roll is installed.
77	Cutter HP Sensor	Detects when the cutter is at the home position.
80	Master Set Sensor	Detects whether a master roll is present.
81	Platen Release Sensor	Detects when the platen pressure is applied against the thermal head.
85	Master End Sensor	Detects when the master runs out.
88	Drum Shift HP Sensor	Detects when the drum screen is at the home position. (The side-to-side image shift is 0.)
90	Drum Shift Sensor	Sends the image position data to the CPU for display on the operation panel.
92	Ink Pump Sensor	Monitors the operation of the ink pump to count how many cycles it has moved.
95	Ink Cartridge Set Sensor	Detects if the ink cartridge is in place.
96	Idling Roller HP Sensor	Detects when the idling roller is at the home position.

Others

Index No.	Name	Function
14	Xenon Lamp	Applies light to the original for exposure.
20	Interface Connector	Connects the machine to the PC controller.
34	Print and Master Counters	Keeps track of the total number of prints and masters.
76	Master Feed Clutch	Controls the master feed control roller operation to feed the master.
79	Thermal Head	Burns the image of the original onto the master.
93	Thermistor	Detects the temperature inside the drum to adjust various process.
94	Ink Detecting Pin	Detects if ink is present in the drum.

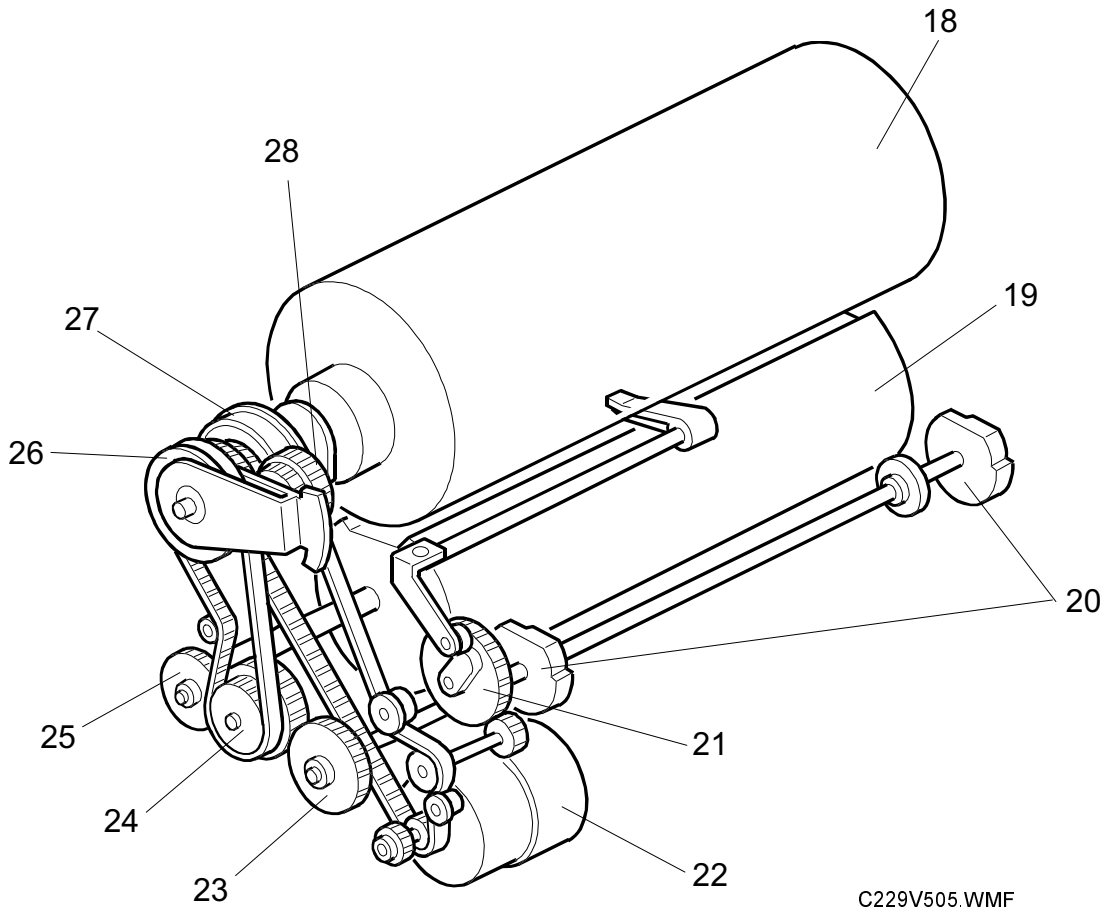
1.7 DRIVE LAYOUT

1.7.1 OVERVIEW



1. Clamper Opening Arm Sector Gear (for the master eject position)
2. Master Pick-up Roller Sector Gear
3. Master Eject Motor
4. Image Shift Motor
5. Pressure Plate Motor
6. Exit Pawl Drive Cam Gear
7. Paper Delivery Unit Drive Gear/Pulley
8. Main Motor
9. Pressure Cylinder Drive Gear (Including the Scissors Gear)
10. Registration Roller Lifting Cam Drive Gear
11. Registration Motor
12. Paper Feed Motor
13. Paper Table Motor
14. Clamper Motor
15. Drum Guide
16. Master Feed Motor
17. Master Feed Clutch

1.7.2 MAIN DRIVE

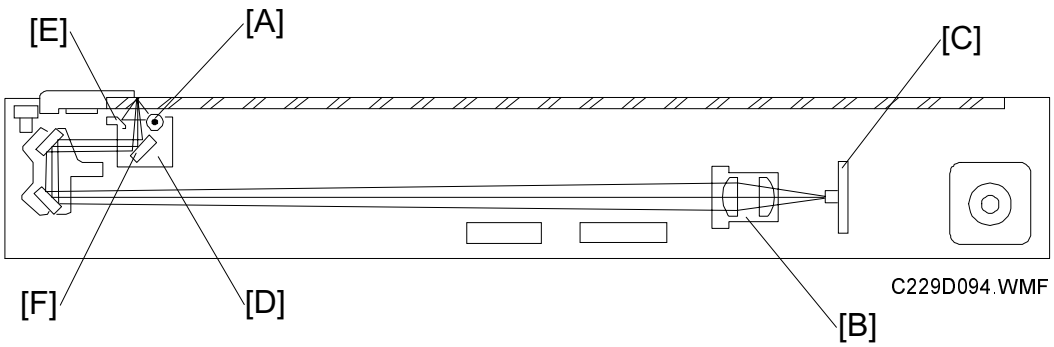


18. Drum
19. Pressure Cylinder
20. Printing Pressure Cam
21. Exit Pawl Drive Cam Gear
22. Main Motor
23. Printing Pressure Cam Drive Gear
24. Idler Gear/Pulley
25. Pressure Cylinder Drive Gear (including the Scissors Gear)
26. Primary Gear/Pulley
27. Drum Drive Gear/Pulley
28. Image Shift Gear

2. DETAILED SECTION DESCRIPTIONS

2.1 SCANNER AND OPTICS

2.1.1 OVERVIEW



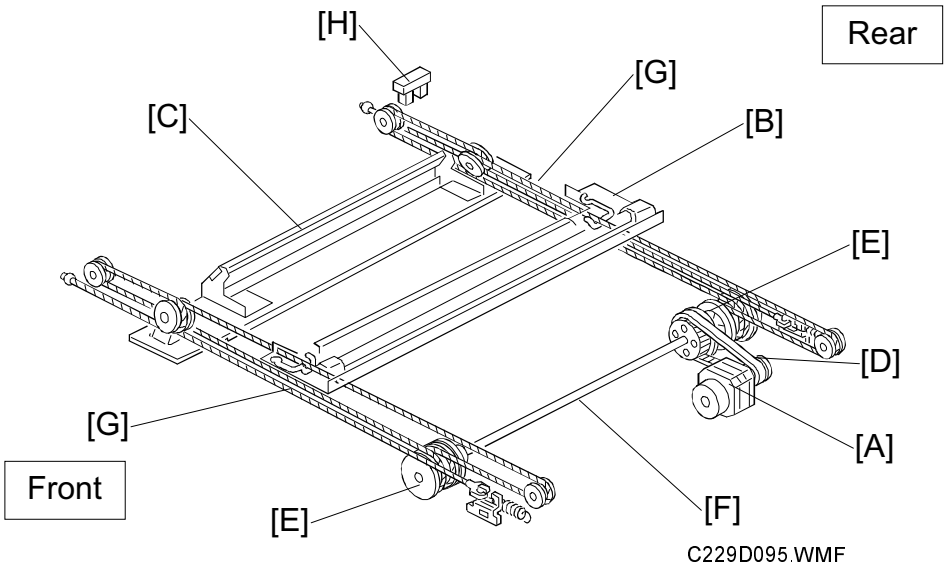
The exposure lamp, a xenon lamp [A], illuminates the original. The 1st, 2nd, and 3rd mirrors, and a lens [B] reflect the image onto a CCD (Charge Coupled Device) [C].

The 1st scanner [D] consists of the exposure lamp, a reflector [E], and the 1st mirror [F].

A DC power supply energizes the exposure lamp to avoid uneven light intensity when the 1st scanner moves in the sub-scan direction. The entire exposure lamp surface is frosted to ensure even exposure in the main scan direction.

The reflector reflects light with almost equal intensity, to reduce shadows on pasted originals.

2.1.2 SCANNER DRIVE



A stepper motor drives the scanner. The scanner drive motor [A] drives the 1st and 2nd scanners [B, C] through the timing belt [D], scanner drive pulley [E], scanner drive shaft [F], and two scanner wires [G].

- Book mode -

The scanner drive board controls and operates the scanner drive motor. In full size mode, the 1st scanner speed is 42.33 mm/s during scanning. The 2nd scanner speed is half that of the 1st scanner.

In reduction or enlargement mode, the scanning speed depends on the magnification ratio (M: 0.50 to 2.00). The returning speed is always the same, in both full size and magnification modes. Changing the scanner drive motor speed changes the image length in the sub-scan direction. Image processing on the MPU board accomplishes reduction and enlargement in the main scan direction.

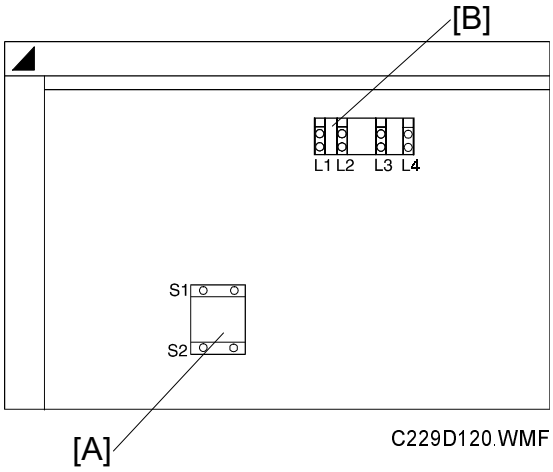
SP6-011-1 changes the motor speed and therefore adjusts the magnification ratio in the sub-scan direction.

- ADF mode -

During scanning, the scanners are always in their home positions (when the scanner H.P sensor [H] detects the 1st scanner). The ADF motor feeds the original through the ADF. In reduction/enlargement mode, changing the ADF motor speed changes the image length in the sub-scan direction. Magnification in the main scan direction is done on the MPU board, in the same manner as book mode.

SP6-011-2 changes the ADF motor speed and therefore adjusts the magnification ratio in the sub-scan direction.

2.1.3 ORIGINAL SIZE DETECTION IN PLATEN MODE



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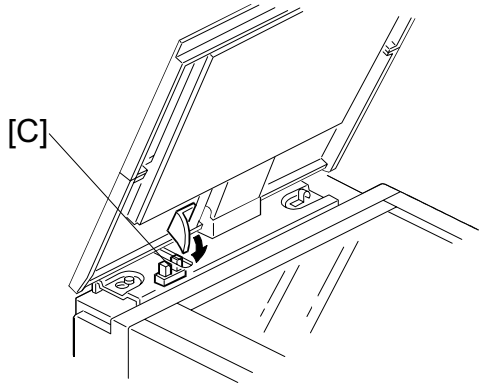
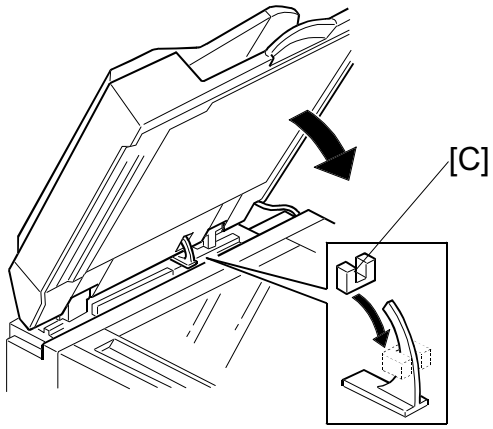


C229D096.WMF



C229D116.WMF

In Platen mode, the size of paper on the paper table usually determines the image reading area for the original. If Reduction or Enlargement mode is used, the magnification ratio affects the image reading area.

However, for Auto Magnification, Image Rotation, or Image Repeat modes combined with Platen mode, the original width [A] and length [B] sensors detect the original size.

The sensors for original size detection are in the optics cavity. There are six reflective sensors.

The platen cover sensor [C] or the DF position sensor [D] informs the main CPU of the original size when the platen is about 15 cm above the exposure glass. At this time, only the sensors located underneath the original receive the reflected light and switch on. The other sensors remain off. The main CPU can recognize the original size from the number of activated sensors.

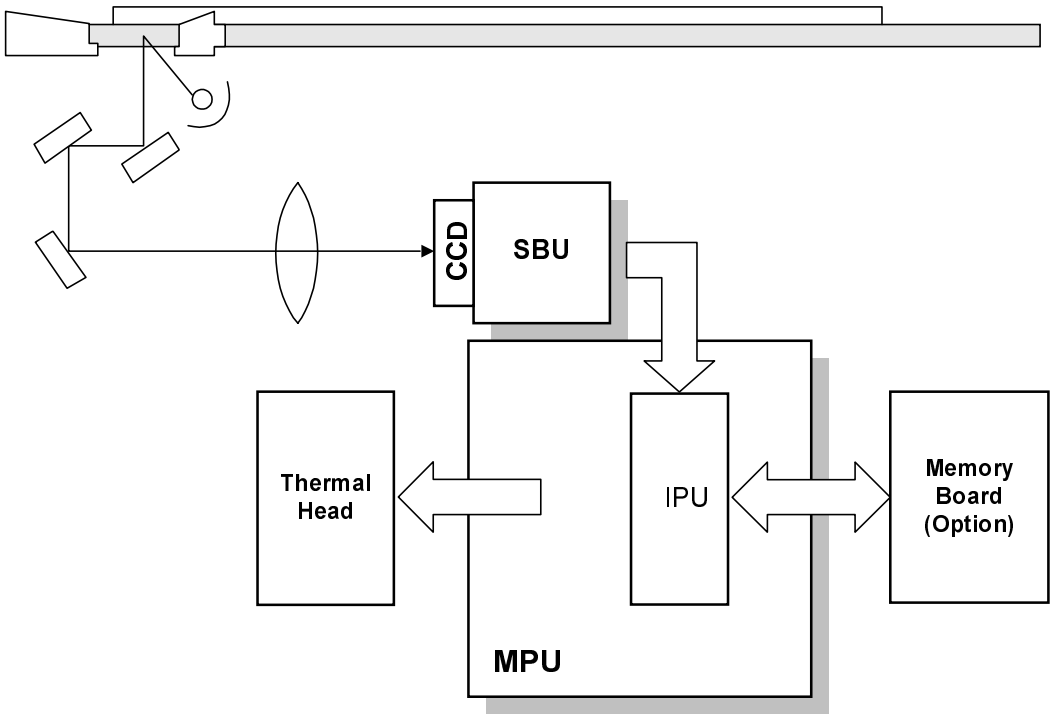
Original Size		Length Sensors				Width Sensors	
A4/A3 version	**LT/DLT version**	**L1**	**L2**	**L3**	**L4**	**S1**	**S2**
A3	11" x 17"	O	O	O	O	O	O
B4	10" x 14"	O	O	O	O	O	X
-	8 1/2" x 14"	O	O	O	O	X	X
F4	-	O	O	O	X	X	X
A4—L	8 1/2" x 11"	O	O	X	X	X	X
B5—L	-	O	X	X	X	X	X
A4—S	11" x 8 1/2"	X	X	X	X	O	O
B5—S	-	X	X	X	X	O	X

NOTE: O: On (Paper Present), X: Off

The above table shows the sensor output for each original size. A message will appear in the operation panel display for other combinations.

2.2 IMAGE-PROCESSING

2.2.1 OVERVIEW



C229D501.WMF

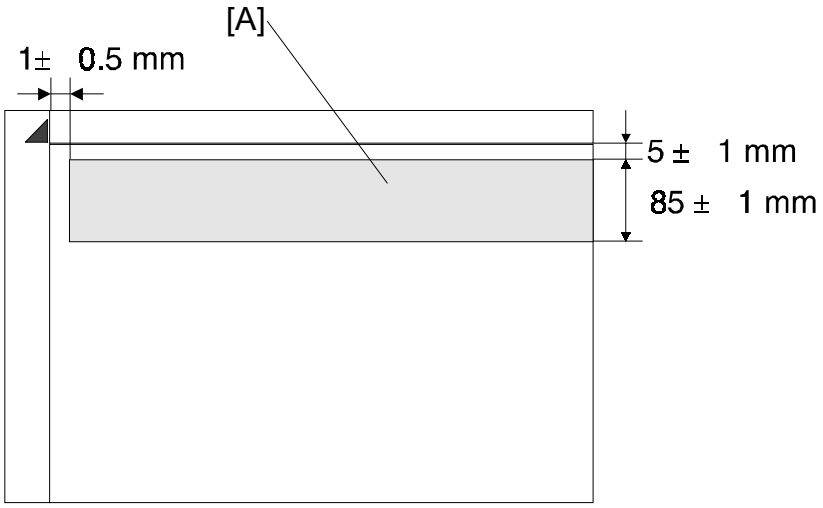
The CCD converts the light reflected from the original into an analog signal. The CCD line has 5,000 pixels and the resolution is 400 dpi (15.7 lines/mm).

After the above process, the A/D converter built into the SBU transforms the analog signals into 8-bit signals. This assigns a value to each pixel from a scale of 256 grades. Then, the digitized image data goes to the MPU board.

The image data then goes to the IPU (Image-processing Unit) IC on the MPU board, which carries out the following processes on the image data:

1. Auto shading
2. Filtering (MTF and smoothing)
3. Magnification
4. Binary processing

2.2.2 AUTO BACKGROUND CORRECTION



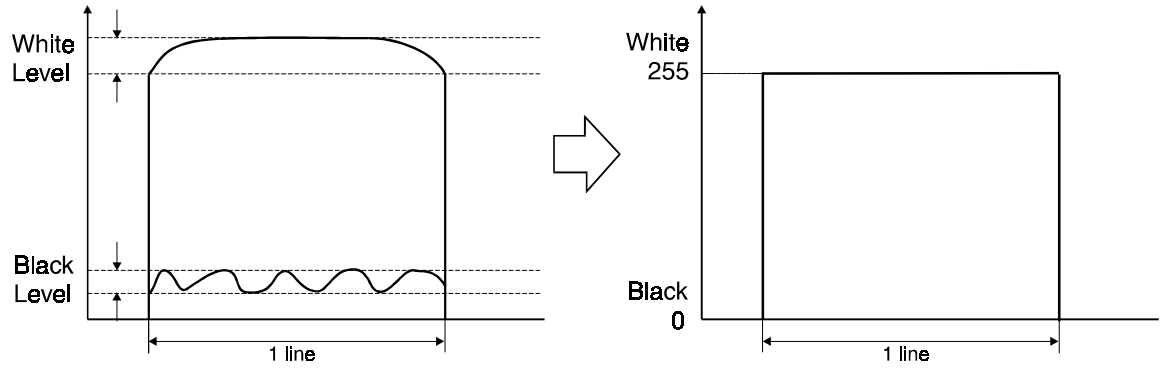
Auto background correction mode can be used in Photo/Letter, Photo, and Tint modes. The default setting does not allow the user to select auto background correction mode. (Use SP 2-31 to enable this mode.)

Auto background correction prevents the background of an original from appearing on copies.

While scanning the original, the background density detection area [A] is also scanned. This area [A] is a narrow strip at the start of the main scan line, as shown. As the scanner scans down the page, the IPU on the MPU detects the peak white level for each scan line, within this narrow strip only. From this peak white level, the IPU determines the reference value for the A/D conversion for the scan line. The IPU then sends the reference value to the reference controller on the SBU.

When an original with a gray background is scanned, the density of the gray area is the peak white level density. Therefore, the original background will not appear on copies. This feature corrects any changes in background density down the page, because peak level data is taken for each line scanned.

2.2.3 AUTO SHADING



There are two auto shading methods: black level and white level correction. Auto shading corrects errors in the signal level for each pixel.

- Black Level Correction -

The CPU reads the black dummy data from one end of the CCD signal (64 pixels are blackened at the end) and takes an average of the black dummy data. Then, the CPU deletes the black level value of each image pixel.

- White Level Correction -

The machine reads a reference waveform from the white plate, before scanning the original. The average of the white video level for each pixel is stored as the white shading data in the IPU.

The IPU chip corrects the video signal information for each pixel obtained during image scanning.

2.2.4 FILTERING AND MAIN SCAN MAGNIFICATION/REDUCTION

Overview

Filtering and main scan magnification process the image data after auto shading. However, to reduce moire in the image, the processing order depends on the reproduction ratio, as follows:

1) Reduction and Full size
   Main Scan Reduction → Filtering
2) Enlargement
   Filtering → Main Scan Magnification

Filtering

The MTF and smoothing filters are software filters that enhance the desired image qualities of the selected original mode.

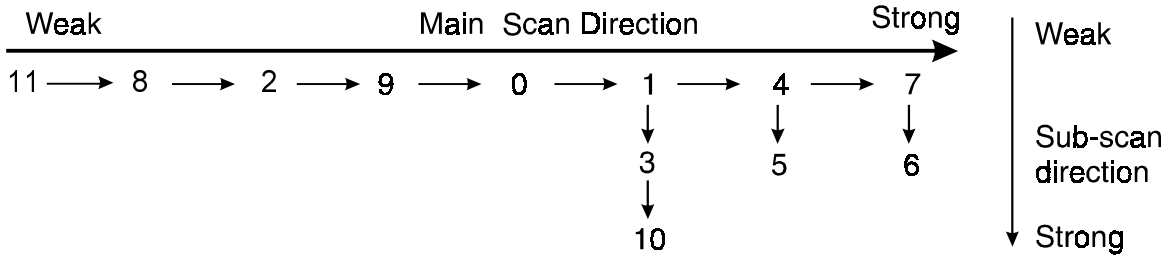
The MTF filter, used in all modes except Tint mode (which uses the smoothing filter), sharpens the image.

SP6-082 adjusts the filter strengths for MTF mode.

The diagram below shows how the number stored in the SP mode afects the strength of the filter.

NOTE: 1) Do not set the filter strength number to 1. Abnormal images may result.
2) The smoothing filter strength is not adjustable.

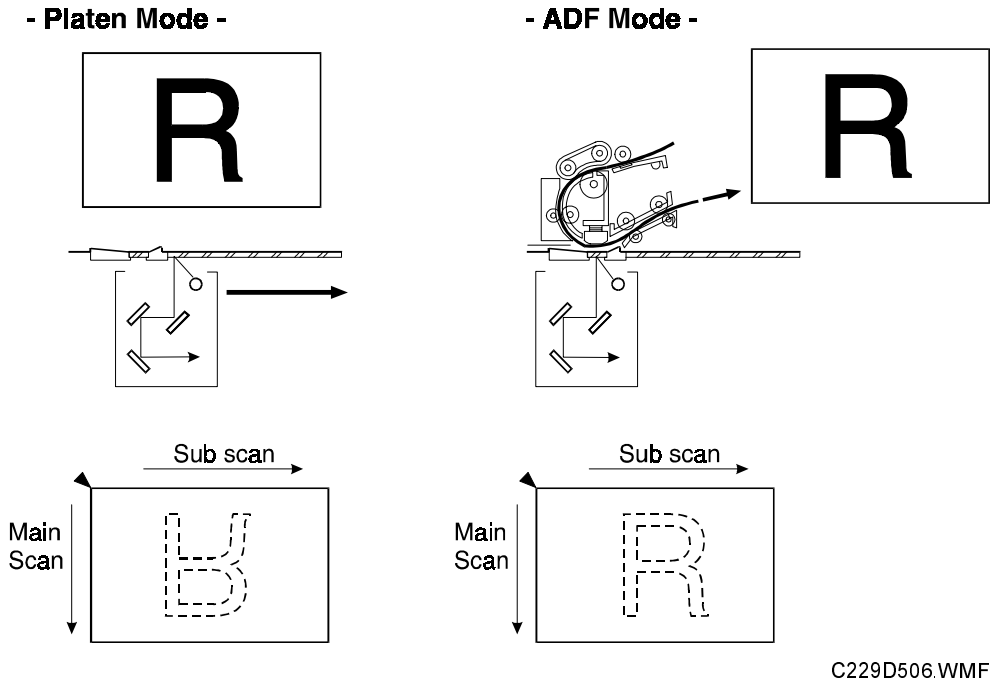
- MTF Filter -



Note: The value is the filter number

C229D505.WMF

Main Scan Magnification/Reduction



The IPU chip handles reduction and enlargement in the main scan direction.

NOTE: Changing the scanner speed accomplishes reduction and enlargement in the sub-scan direction.

When making a copy using the ADF, the magnification circuit creates a mirror image. This is because the scanning starting position in the main scan direction is at the other end of the scan line in ADF mode (as compared with platen mode). In platen mode, the original is placed face down on the exposure glass, and the corner at [A] is at the start of the main scan. The scanner moves down the page. In ADF mode, the ADF feeds the leading edge of the original to the DF exposure glass, and the opposite top corner of the original is at the main scan start position.

To create the mirror image, the CPU stores the main scan line data in the LIFO (Last In First Out) memory on the MPU, from the last pixel. When loading the main scan line data from the LIFO memory, the CPU loads the first pixel of the main scan line.

2.2.5 BINARY PROCESSING

In the IPU chip, the 8-bit data is converted into 1-bit data for black or white pixels. The binary processing for the letter mode is different from that for the photo mode and the letter/photo mode as follows:

1) Letter mode: Binary processing
2) Letter/Photo mode: Binary processing + error diffusion
3) Photo mode: Binary processing + error diffusion + dithering

These processes are used as follows.

- Binary Processing with Gamma Curve Compensation -

This process converts each video signal level from 8-bit to 1-bit (black and white image data) in accordance with a threshold value.

The threshold value changes based on a compensation curve (Gamma curve) which corresponds to selected image settings. For example, if a darker image is selected, a compensation curve, which converts each pixel value to a higher number, is selected. This ensures accurate generation of the gray scale from black to white.

- Error Diffusion - (Photo mode and Letter/Photo modes only)

The error diffusion process reduces the difference in contrast between light and dark areas of a halftone image. This process corrects each pixel using the difference between it and surrounding pixels. It then compares the corrected pixels with the error diffusion matrix.

- Dithering - (Photo mode with Screen mode only)

Dithering compares each pixel with a pixel in the dither matrix. Several matrixes are available, to increase or decrease the detail on the copy. Dithering is used only when one of 4 coarseness settings (Screen mode) is used in combination with Photo mode.

2.2.6 OPTIONAL MEMORY BOARD

The optional memory board, or editing function board, has 4-Mbyte RAM, which corresponds to the amount of memory required for an A3 original. This enables the following image editing functions.

- Memory Combine Mode -

Combined images of 4, 8, or 16 originals are printed on the same sheet of paper.

- Overlay -

Overlay merges two different originals onto the same sheet of paper.

- Stamp Printing Mode -

This mode enables stamping modes such as, the date, page number, preset message, and user custom stamps.

- Make-up Printing Mode -

The user makes command sheets to specify how various areas of the original will be processed. The user must be sure to scan the command sheets before the original. The image-processing chip in the MPU modulates the image data for the command sheet and then stores the modulated command data on the memory board.

The image data for the original is also converted and modulated. The MPU edits the modulated image data, the stored command area data, and the background pattern.

Positive/Negative can be used with this mode.

- Report Print Mode -

This mode prints the following data:

- User reports
- Jam and error counter data
- The number of people in each class set by the user
- Number of prints and masters for each user code account
- SP mode data for service

- Image Rotation Mode -

When the orientation for the original differs from the paper selected, the machine automatically rotates the original image 90 degrees to match the paper orientation.

SP 2-150 can disable this mode.

2.2.7 THERMAL HEAD

Specifications

- Length 292.6 mm
- Number of thermal head elements 4608
- Density of thermal head elements 400 dpi

Thermal Head Control

The thermal head contains heating elements at a density of 400 dpi. The thermal heating elements melt the over-coating and polyester film layers of the master, in accordance with the image signal for each pixel.

This model has an independent power supply unit for the thermal head. It applies power (VHD) to the thermal heating elements. The power source varies from one head to another since the average resistance of each element varies. Therefore, when replacing the thermal head or power supply unit, it is necessary to readjust the applied voltage to the specific value for the thermal head.

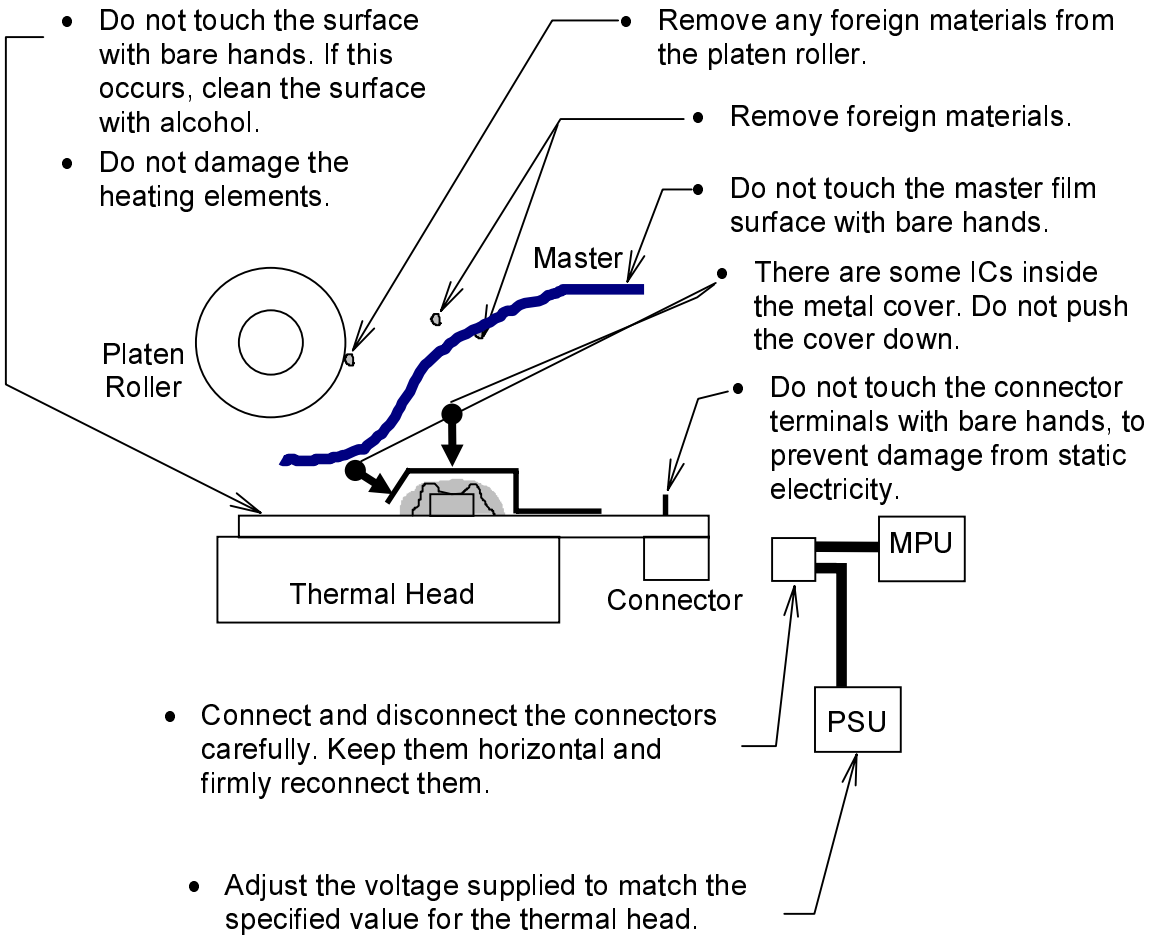
Thermal Head Protection

The thermistor on the thermal head provides thermal head protection, preventing the thermal head from overheating when processing a solid image. The CPU checks for any abnormal condition when the Start key is pressed; it displays an SC code on the operation panel as follows:

SC Code	Conditions	Detecting Component
SC03-03	Over 54°C	Thermistor
SC03-02	Under - 20°C (Normally in this case, the thermistor is open, or a related connector is disconnected.)	Thermistor
SC03-01	When the pulse width that controls the thermal head energy becomes abnormal, master making stops and generates this SC code.	MPU
SC03-00	The CPU monitors the ID signal from the thermal head, which identifies the thermal head type. If an abnormal ID signal is detected just after installing the master making unit in the machine, it generates this SC code.	MPU

Remarks for Handling the Thermal Head

Pay careful attention to the following remarks when servicing:

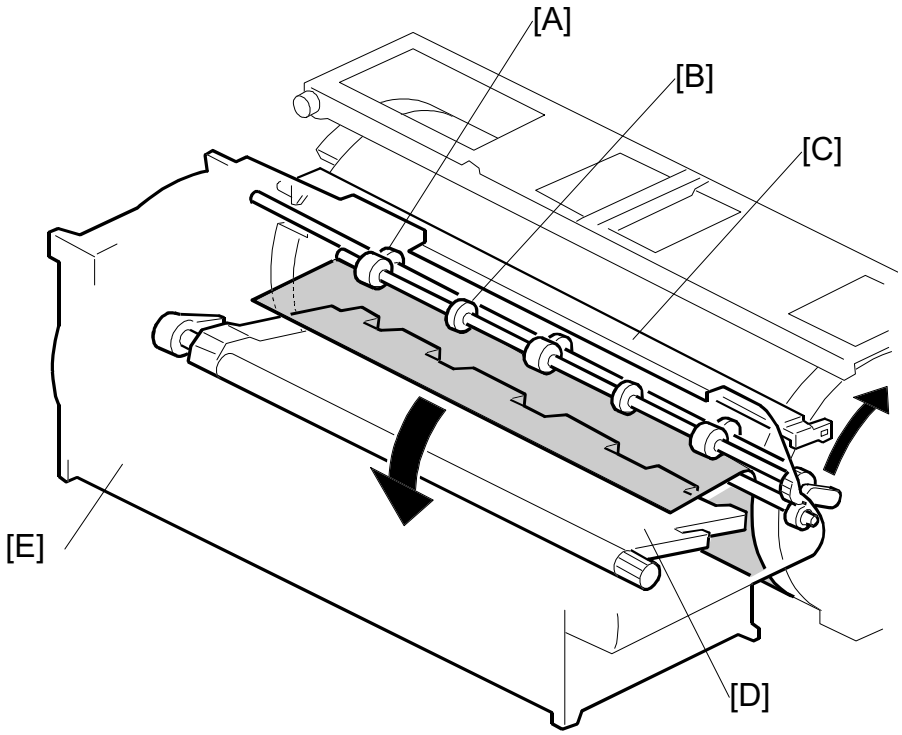

• Do not touch the surface with bare hands. If this occurs, clean the surface with alcohol.
• Do not damage the heating elements.
• Remove any foreign materials from the platen roller.
• Remove foreign materials.
• Do not touch the master film surface with bare hands.
Master
• There are some ICs inside the metal cover. Do not push the cover down.
Platen Roller
• Do not touch the connector terminals with bare hands, to prevent damage from static electricity.
MPU
Thermal Head
Connector
PSU
• Connect and disconnect the connectors carefully. Keep them horizontal and firmly reconnect them.
• Adjust the voltage supplied to match the specified value for the thermal head.

- Other Remarks -

Avoid using the machine under humid conditions. Moisture tends to condense on the thermal head, damaging the elements.

2.3 MASTER EJECT

2.3.1 OVERVIEW



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The master remains wrapped around the drum to prevent the ink from drying. Therefore, making a new master begins from the master ejecting process.

When the Start key is pressed to scan the original, the drum rotates from the home position to the master eject position. As soon as the drum reaches the master eject position, the drum master clamper [C] opens. The drum position lock mechanism locks the drum at this position to prevent the drum from moving during master ejection.

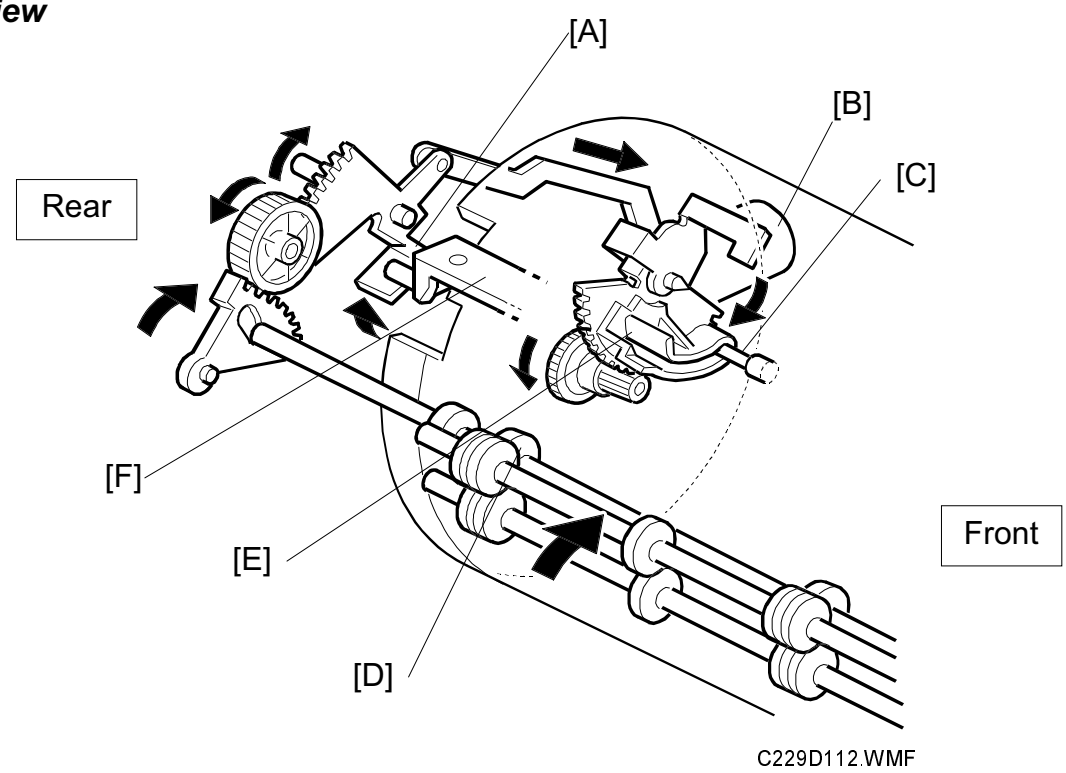
At the same time, the master pick-up roller [A] touches the drum, picking up the leading edge of the master on the drum. Then, the master is caught by the upper and lower master eject rollers [B] and is transported into the master eject box [E].

When the trailing edge of the master passes the roller, the pressure plate [D] begins to compress the master into the box.

Before this process is complete, the original scanning and master making has already started, and the drum will then rotate to the master making position.

2.3.2 MASTER EJECT MECHANISM

Overview



Two photosensors (the 1st and 2nd drum position sensors) and the feeler on the rear drum flange determine the drum position. The drum is at the home position when the feeler actuates the 1st drum position sensor. At this position, the drum master clamper, which clamps the leading edge of the master onto the drum, is located at the bottom of the drum. (For details, refer to Drum Drive Mechanism in the Drum section.)

The drum turns 114.5 degrees from the home position to reach the master eject position (there is no sensor for master eject position detection – main motor encoder pulses only). As soon as the drum stops, the clamper motor [B] starts to open the drum master clamper [F]. The master pick-up roller [D] moves against the drum at the same time, because it is connected through an idle gear.

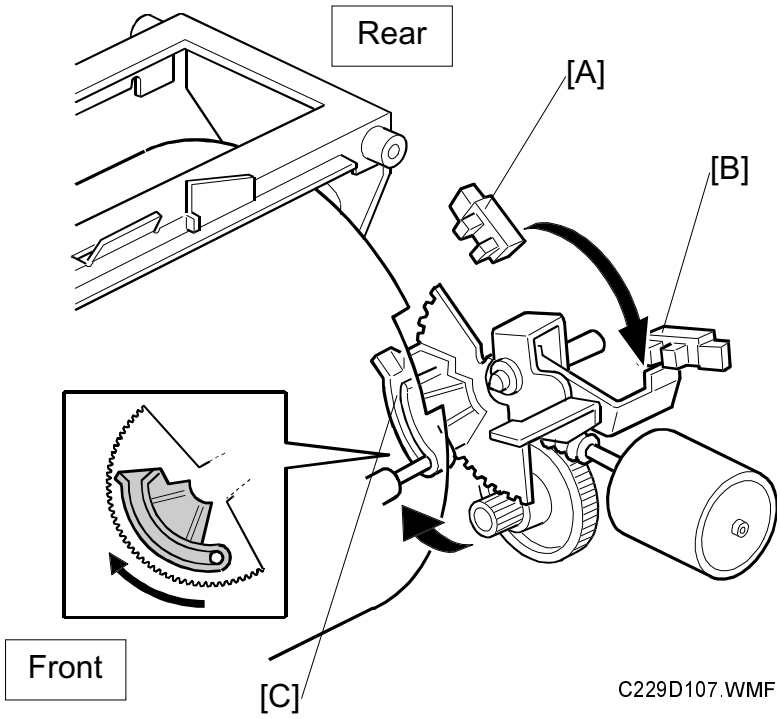
A link plate connects the drum guide [E] to the clamper opening arm [A]. So, when the arm moves, the drum guide also moves, and this locks the drum position.

NOTE: 1) To lock the drum, the drum guide catches one of two studs at different positions on the drum. The drum guide catches one stud at the master eject position [C], and the other stud at the master making position.
2) The drum master clamper also opens when the drum is at the master making position. However, it uses a different clamper-opening arm. For details, refer to the Master Making section.
3) Do not clean the inside of the master clamper with alcohol or other strong solvents. Use a cloth dampened with water. This prevents the magnetic force from weakening. This part requires periodic cleaning.

Drum Lock Mechanism

The clamper motor drives the drum guide [C]. The clamper closed position sensor [A] and clamper open position sensor [B] monitor the position of the drum guide.

When the drum reaches the master eject position, the drum guide moves until the clamper open position sensor [B] is actuated then deactuated (the actuator must go through the sensor). This engages the stud on the rear drum flange.



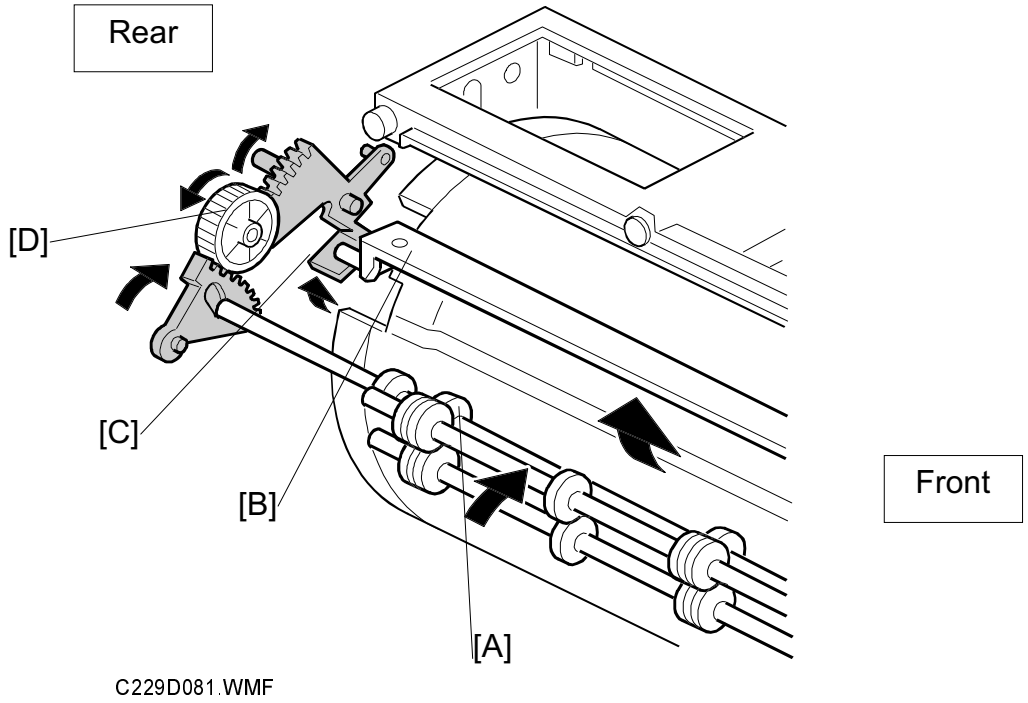
Before the drum starts rotating to the master making position, the drum guide returns to the home position. The clamper closed position sensor [A] determines this position.

NOTE: The same drum guide also moves when the drum is at the master making position. (There is another stud on the rear drum flange, which is used to secure the drum at the master making position.)

A link plate at the master eject position synchronizes the master clamper with the drum guide movement.

To open the clamper, the drum guide (with the clamper opening arm) must move a greater distance than at the master making position. Therefore, at the master eject position, the drum guide moves (to open the master clamper) until the clamper open position sensor [B] turns on (interrupted by the feeler) and then turns off again, as shown in the diagram. Refer to the Master Feed section to compare the two mechanisms.

Master Pick-up Roller Drive and Master Clamper Open

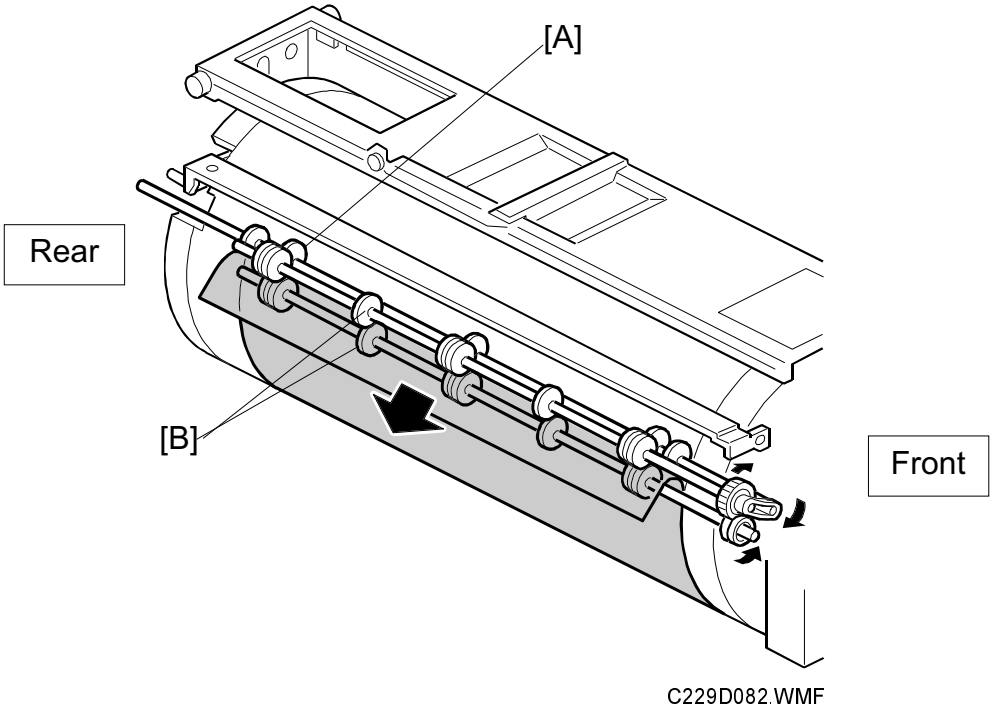


When the clamper motor opens the drum master clamper [B], the master pick-up roller [A] contacts the leading edge of the master on the drum. The clamper motor moves the master pick-up roller against the drum through the idle gear [D], while driving the clamper opening arm [C].

At the same time as the drum master clamper [B] closes after the master is picked up, the master pick-up roller [A] also moves back to the original position.

The drum guide is also released at the same time. The drum continues turning towards the master making position while the used master is removed from the drum.

Master Eject and Transportation



The master pick-up roller [A] and the upper and lower master eject rollers [B] all turn together. They start turning as soon as the drum reaches the master eject position.

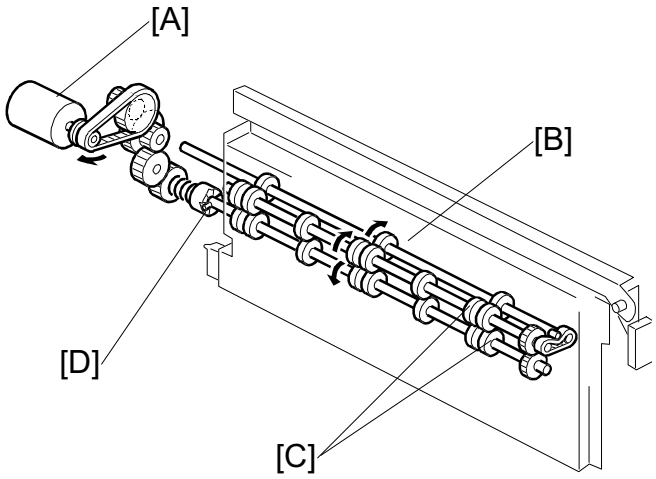
The rollers stop once the leading area of the master is picked up from the drum. (The master eject sensor detects this.) Then, when the drum starts turning, they turn on again to feed the ejected master to the eject box while the drum turns towards the master making position.

The master eject sensor (not shown) is located just under the lower master eject roller, and it monitors the master feeding. If the master is not properly picked up, i.e. it does not activate the sensor; the operation panel displays a master eject jam message.

Master Eject Roller Unit Drive

The master eject motor [A] turns the master pick-up roller [B] with the upper and lower master eject rollers [C].

When the unit is slid out (explained below), the joint [D] disengages.

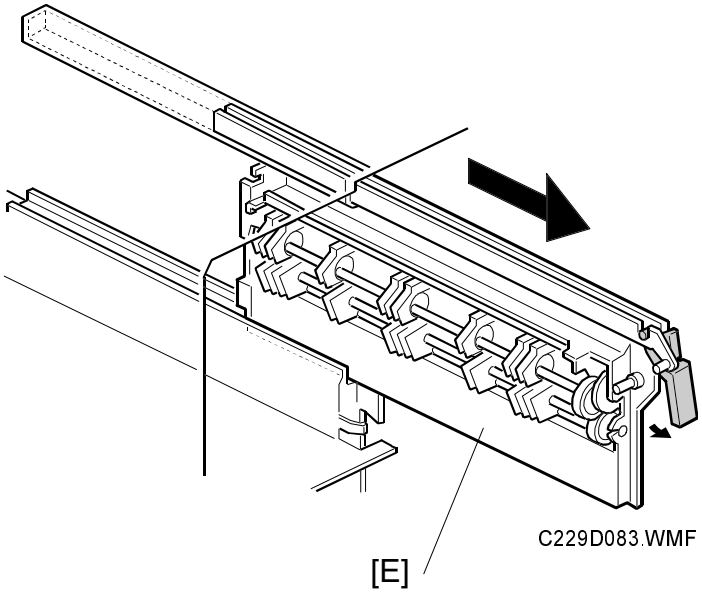


C229d513.WMF

Master Eject Roller Unit Slide-out Mechanism

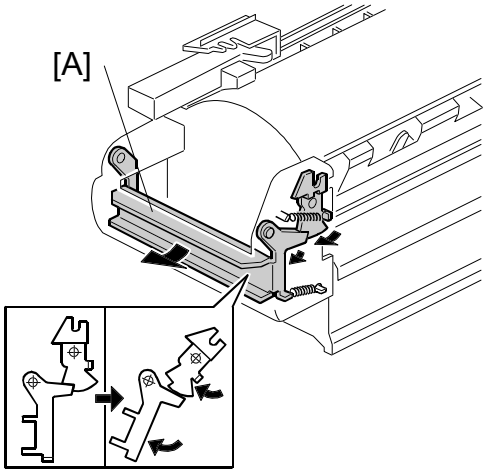
The master eject roller unit [E] can be slid out of the machine as shown for easy master jam removal.

The unit contains the master pick-up roller, upper and lower master eject rollers, and the master eject sensor.

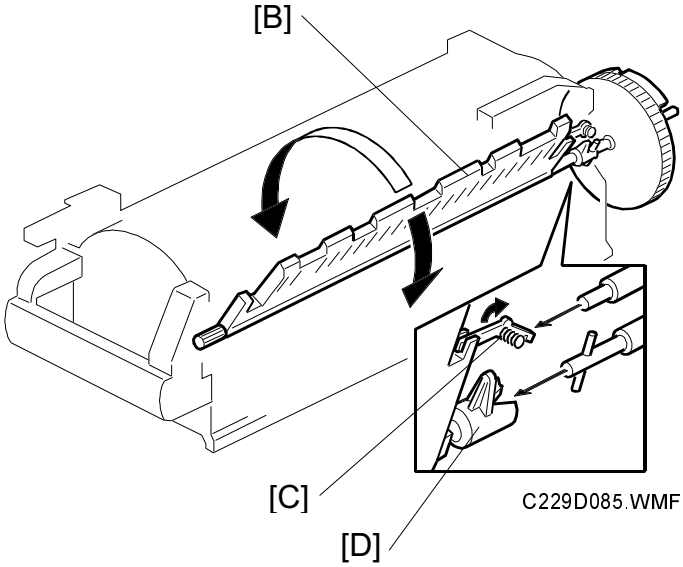


C229D083.WMF

Master Eject Box Mechanism



C229D092.WMF



C229D085.WMF

The user can slide the master eject box out from the operation side of the machine. The front handle of the box [A] has a lock mechanism as shown above.

The master eject box contains a pressure plate [B], which compresses the ejected masters in the box. The pressure plate also works as a guide plate feeding the ejected master into the box.

An independent dc motor, the pressure plate motor, drives the pressure plate. The motor is in the pressure plate drive unit, on the rear frame of the machine separate from the master eject box.

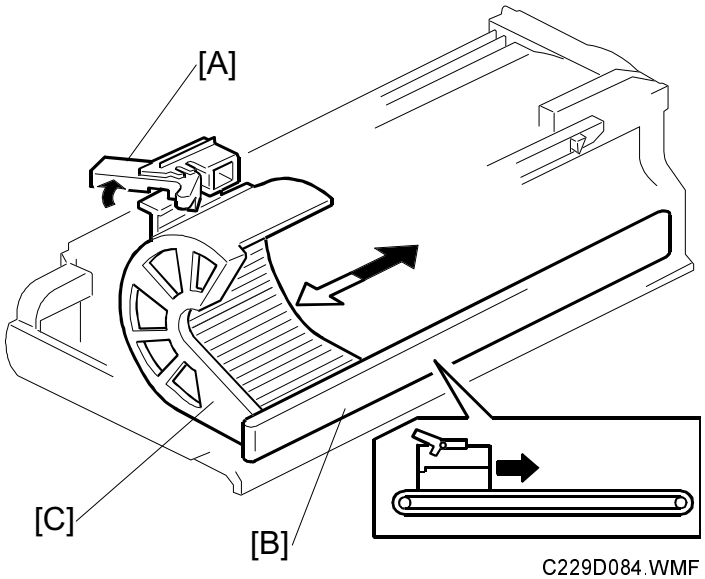
When the master eject box is slid out, the joint [D] for the pressure plate drive disengages. At the same time, the lock lever [C] turns, due to tension from a spring, to hold the pressure plate [B] in the home position.

When the master eject box is re-installed, the drive joint [D] is connected and the pressure plate lock lever [C] is released as shown above.

The ejected masters in the box can be taken out by sliding the eject lever [A]. The inner bottom case [C] moves towards the rear of the box.

Masters are ejected from an open door at the rear of the box. The side opposite the eject lever side [A] of the inner bottom case is connected to a belt [B]. This helps the inner bottom case move smoothly.

When the master eject box is removed, a push switch (the eject box set sensor) turns off, and the operation panel displays a message.



C229D084.WMF

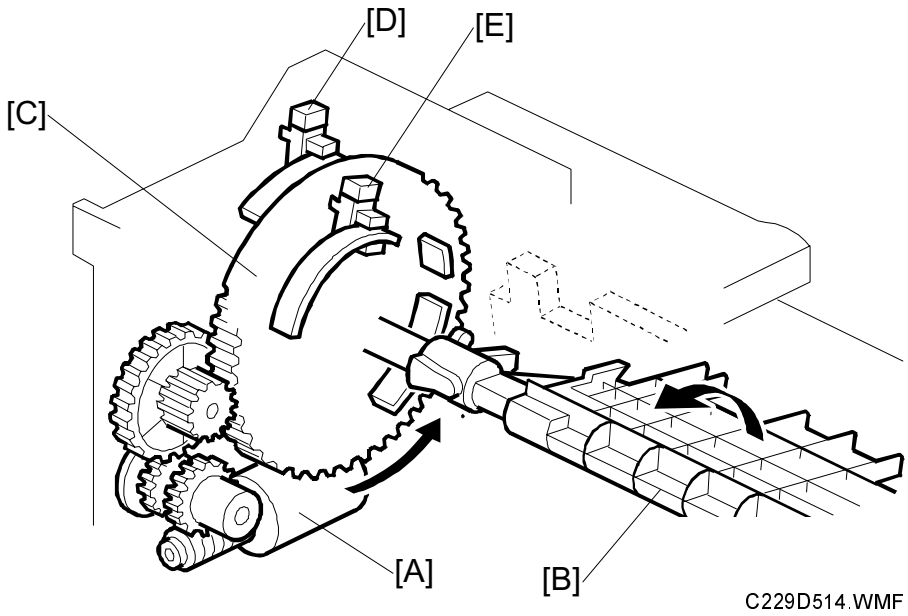
2.3.3 PRESSURE PLATE DRIVE MECHANISM

Overview

There are three phases.

- Homing
  At power on or when recovering from an error or jam, the machine makes sure that the pressure plate is at home position. This is because, if certain errors occur, the pressure plate may not be in the home position at the start of a job
- Master ejection
  The pressure plate rotated into a position where it can act as a feed guide for the used master on its way to the eject box.
- Compression
  The pressure plate compresses the master into the box.

Drive



The pressure plate motor [A] drives the pressure plate [B] through the pressure plate gear [C]. This gear contains actuators for the home position sensor [D] and the limit position sensor [E]. These two sensors monitor the pressure plate position.

The diagram shows a front view of the mechanism. The actuators are on the rear of the pressure plate gear, which is shown as see-through for ease of viewing.

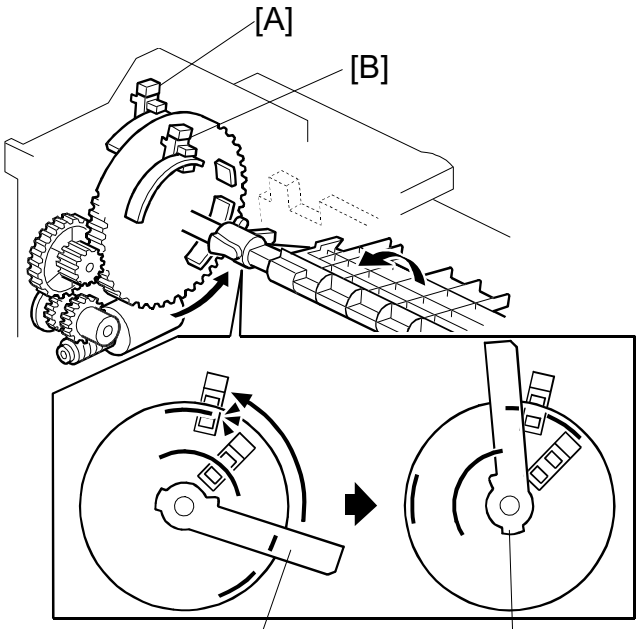
Homing Operation

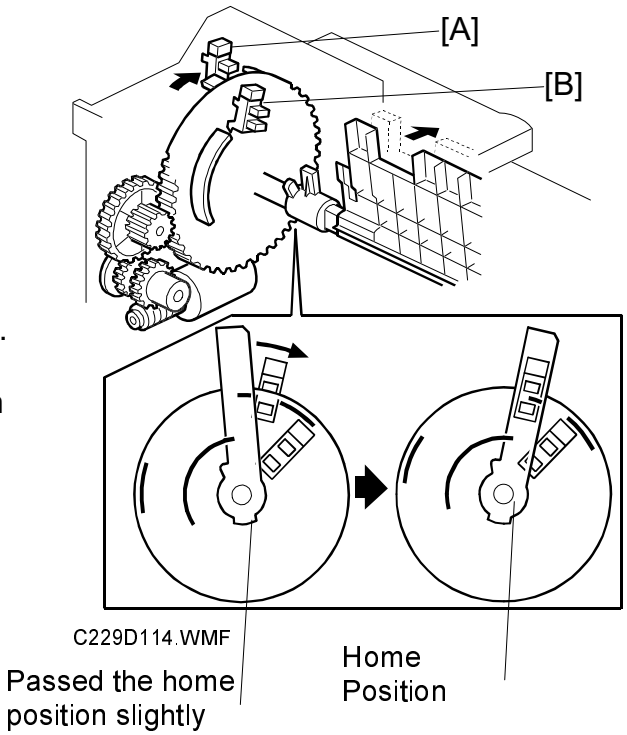
At power on or when recovering from an error or jam condition, the machine carries out the pressure plate homing operation.

If certain errors occur, the pressure plate may not be in the home position. The homing operation starts by turning the pressure plate toward the drum and then it returns to the home position.

The homing operation is as follows:

1. The pressure plate turns clockwise (as seen from the operation side) until both the pressure plate HP sensor [A] and the limit position sensor [B] are actuated.
2. As shown in the upper right diagram, the pressure plate turns counterclockwise until the home position sensor [A] is actuated twice then de-activated. The status of the sensor [A] changes: on ⇒ off ⇒ on ⇒ off.
3. The pressure plate has just slightly passed the home position. Then, as shown in the lower right diagram, the pressure plate again turns clockwise to return to the exact home position. The home position sensor status changes now from: off ⇒ on ⇒ off.

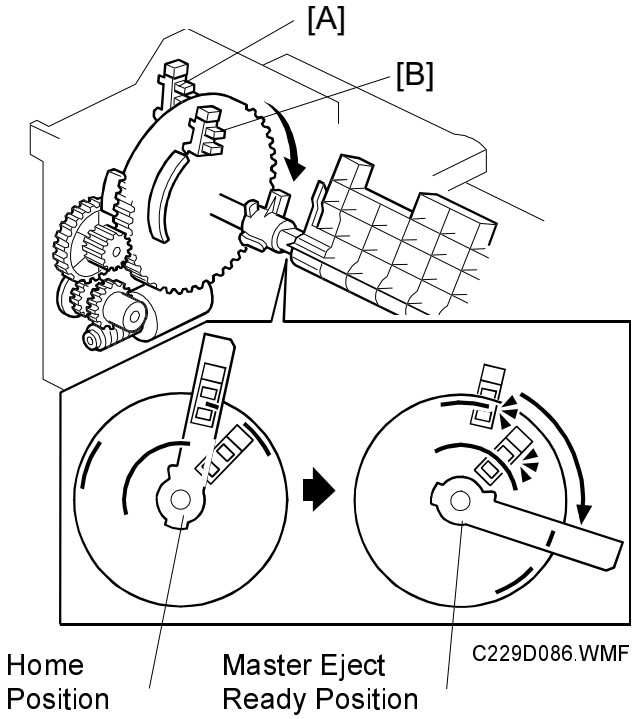




Shift to the Master Eject Position

When the Start key is pressed to make a new master, the drum turns to the master eject position. During this period, the pressure plate travels to the master eject ready position.

The pressure plate turns clockwise (as seen from the operation side) until both the pressure plate HP sensor [A] and the limit position sensor [B] are actuated.



Ejected Master Compression

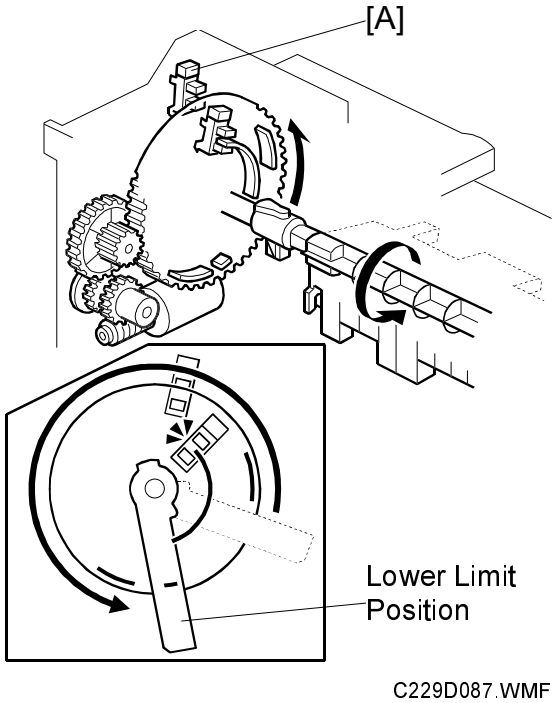
When the ejected master has been fed to the master eject box, the pressure plate compresses the master. During this operation, the machine can recognize how full the eject box is by monitoring the lower limit and home position sensors.

When there are no or very few masters in the box

If there are no or only a few masters in the box, the pressure plate can move to its lowest position. The pressure plate limit position sensor detects this position.

The pressure plate turns counterclockwise from the master eject ready position until the limit position sensor [B] has been actuated twice. The sensor status changes: on ⇒ off ⇒ on.

The pressure plate stays at the lower limit position for 2 seconds, then returns to the home position.



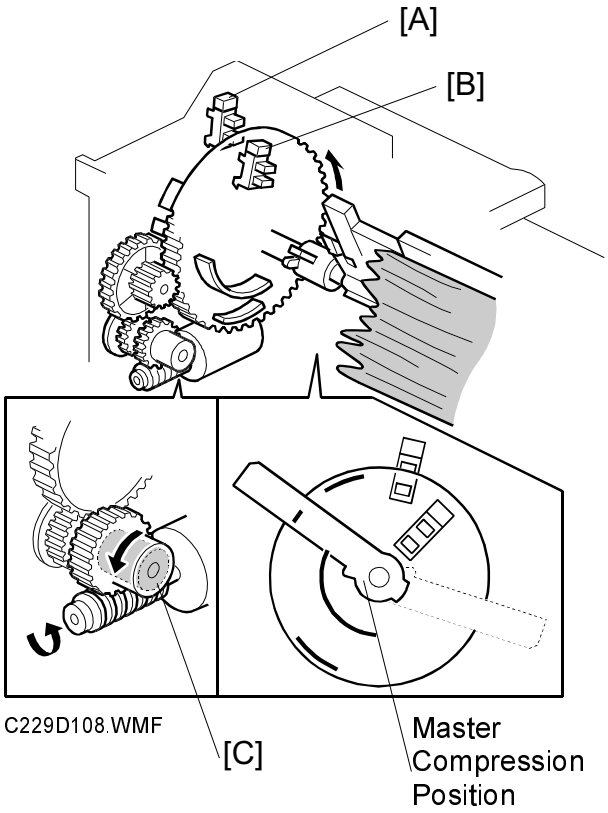
When there are a lot of masters

If there are a lot of used masters in the box, the pressure plate cannot move to the lower limit position.

If the lower limit position sensor [B] is not actuated within 7 seconds after the pressure plate starts traveling from the master eject ready position, the pressure plate motor stops.

The pressure plate stays in the same position for 2 seconds to compress the masters. Then, it returns to the home position.

There is a torque limiter [C] built into the gear. When the built-up masters in the box block pressure plate movement, the torque limiter allows this gear to slip.



C229D108.WMF

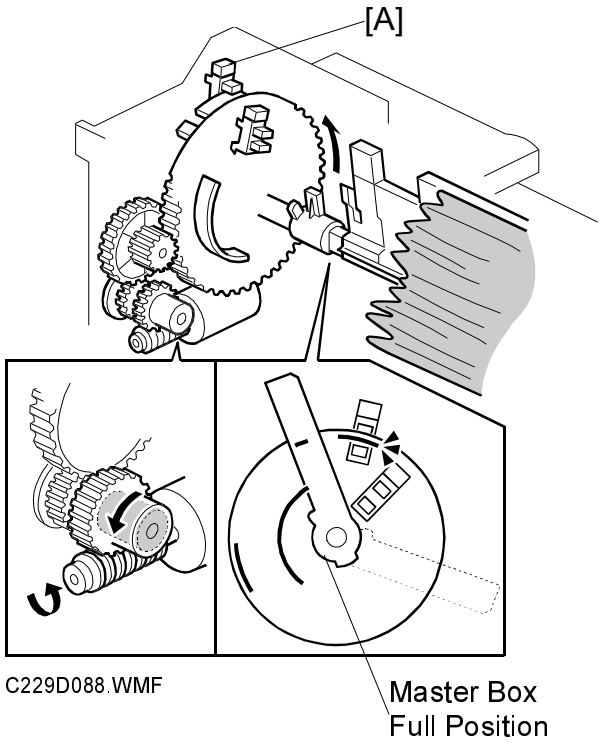
Master Box Full Detection Mechanism

As explained above, the pressure plate motion range narrows as the ejected masters build up in the box. The stopping position of the pressure plate therefore gets closer to the home position.

When the pressure plate cannot travel past the master box full position from the master eject ready position, this means that the master box is full.

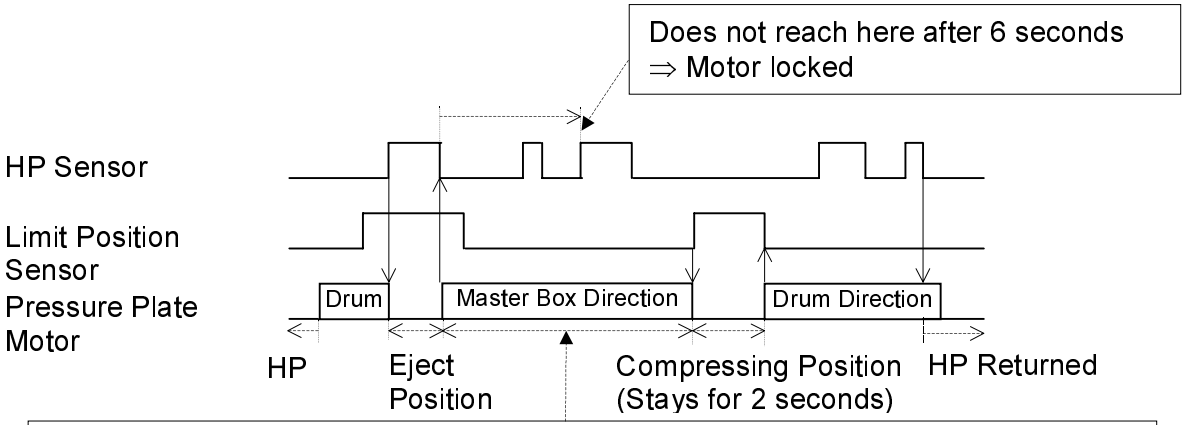
In this case, the home position sensor [A] remains actuated as shown on the right.

The home position sensor status changes (from the master eject ready position): on ⇒ off ⇒ on ⇒ off ⇒ on, and stays on. This means the master box is full and the operation panel displays a message.



C229D088.WMF

Pressure Plate Operation Timing Chart



Check when rotating in the master box direction

- Check Timing -

When one of the following occurs:

1. When the Limit Position Sensor turns on.
2. 6 seconds after the motor turns on.

→ Number of HP Sensor On or Off Edges

(The first 'on' edge is just after the motor starts.)

- 5 times ⇒ Normal
- 4 times ⇒ Master box full
- Less than 4 ⇒ Pressure plate locked (SC06-00 lights)

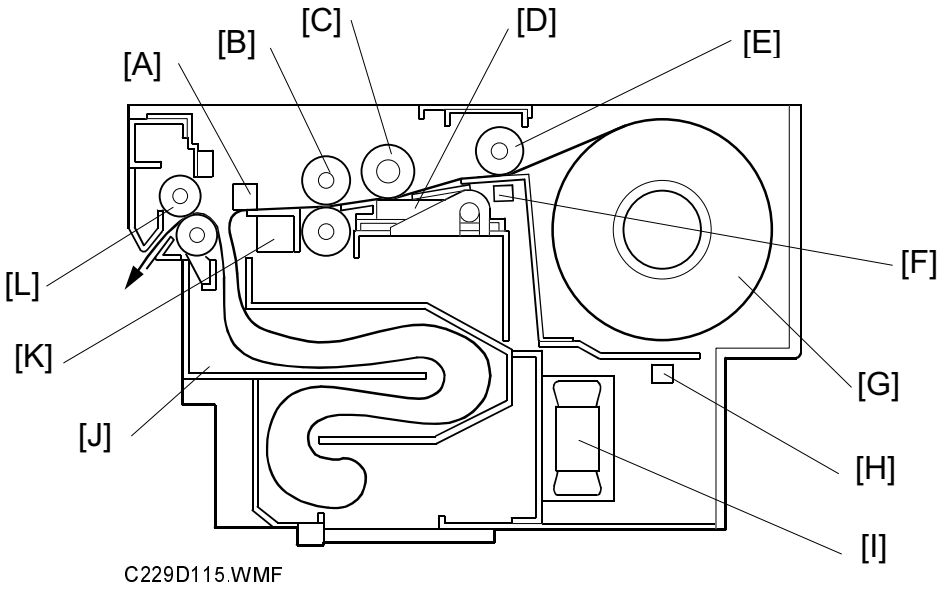
This timing chart shows how the machine counts the number of home position sensor on and off edges to check if the eject box is full or if the mechanism is jammed.

The signal is checked when:

- The limit position sensor turns on – this is when the pressure plate has turned all the way to the lower limit position inside the box, which is only possible if the box is fairly empty.
- At 6 s after the motor turns on

2.4 MASTER FEED

2.4.1 OVERVIEW



A: Master Edge Sensor
B: Tension Roller
C: Platen Roller
D: Thermal Head
E: Master Set Roller
F: Master Set Sensor
G: Master Roll
H: Master End Sensor
I: Master Vacuum Fans
J: Master Buffer Duct
K: Cutter
L: Master Feed Control Roller

Original scanning starts when an original is set and the Start key is pressed. Master making begins at the same time. Although master ejecting is done first, scanning starts very soon after.

The master is a low fiber content paper coated with a thin heat-sensitive film. The heating elements of the thermal head [D] burn the film to copy the scanned image.

The master is fed while the thermal head develops the image on it. The master vacuum fans [I] temporarily suck the fed master into the master buffer duct [J]. This is done because the used master is still being ejected from the drum. When the drum comes to the master making position, the master is fed to the drum and the drum master clamper on the drum clamps the master.

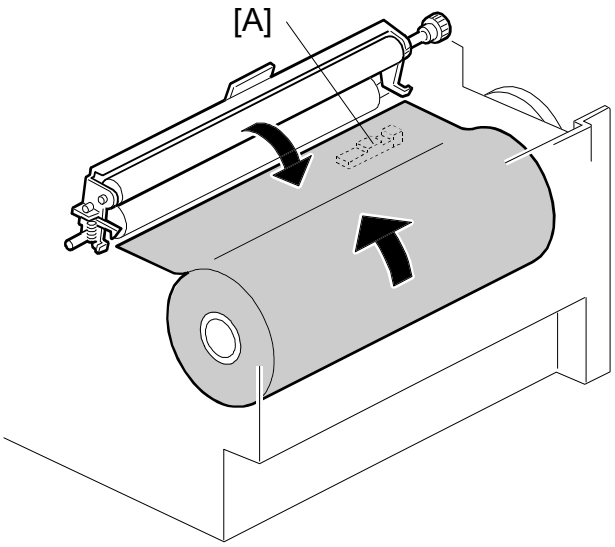
The drum then turns to wrap the master around the drum. When the master has been pulled out of the duct and is pulled tight at the cutter, the cutter [K] cuts the master.

At the same time as the master is wrapping, a sheet of paper, called the trial print, is fed. This ensures that ink transfers to the master on the drum, and that there is a sufficient density of ink for the print run to start. The drum then returns to the home position and is ready for printing.

2.4.2 MASTER SET MECHANISM

Master Roll Set

The master set sensor [A] checks to see if the master roll was installed properly. After inserting the master making unit, the sensor detects the leading edge of the master. The master is fed in until the leading edge reaches the master feed control roller.

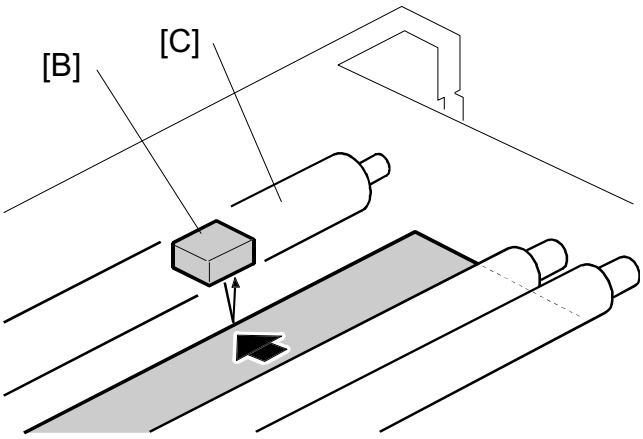


C229D102.WMF

Master Feed and Stop Control (Edge Detection)

While the master is being fed after a roll is put in the machine, the master edge sensor [B] checks the leading edge of the master.

The master is fed 18 mm more after the master edge sensor [B] is activated. It has now been caught by the master feed control roller [C] and it stops. This is the stand-by position for master making.



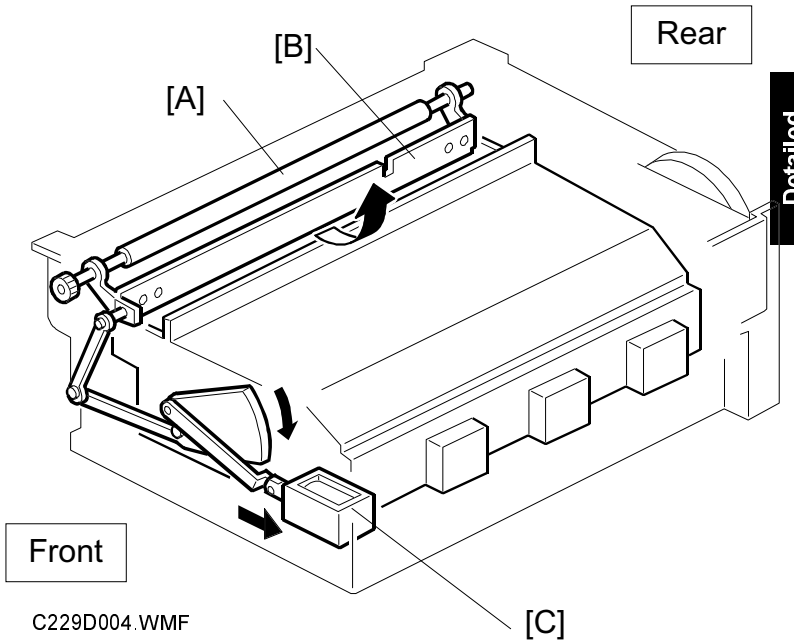
C229D103.WMF

While the master is fed, the platen roller pressure, which is used to press the master against the thermal head, is repeatedly applied and released using the platen pressure release mechanism. This prevents master skew or creasing after a roll has been put in the machine. A later section will describe this process in more detail.

Master Buffer Duct Entrance Control

While the master is being transported to the master feed control roller [A], the duct entrance solenoid [C] closes the master buffer duct entrance plate [B]. This prevents the duct entrance from catching the leading edge of the master.

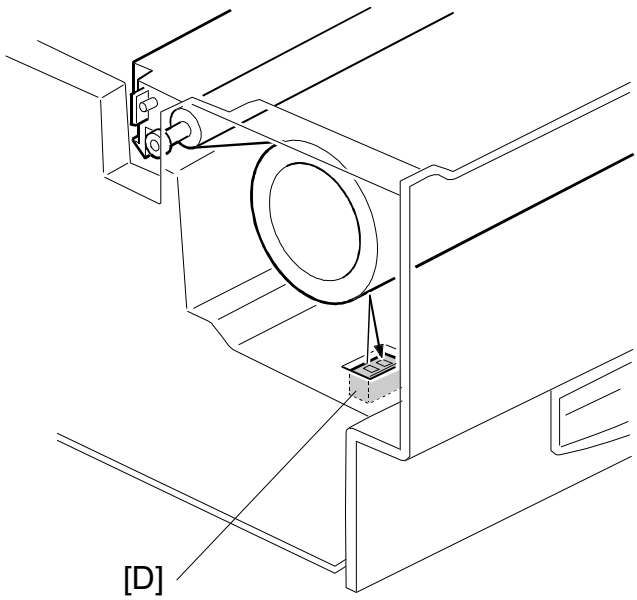
After the master feed control roller [A] catches the master leading edge, the entrance plate is opened. (The normal position of the entrance plate is open.)



C229D004.WMF

Master End Detection

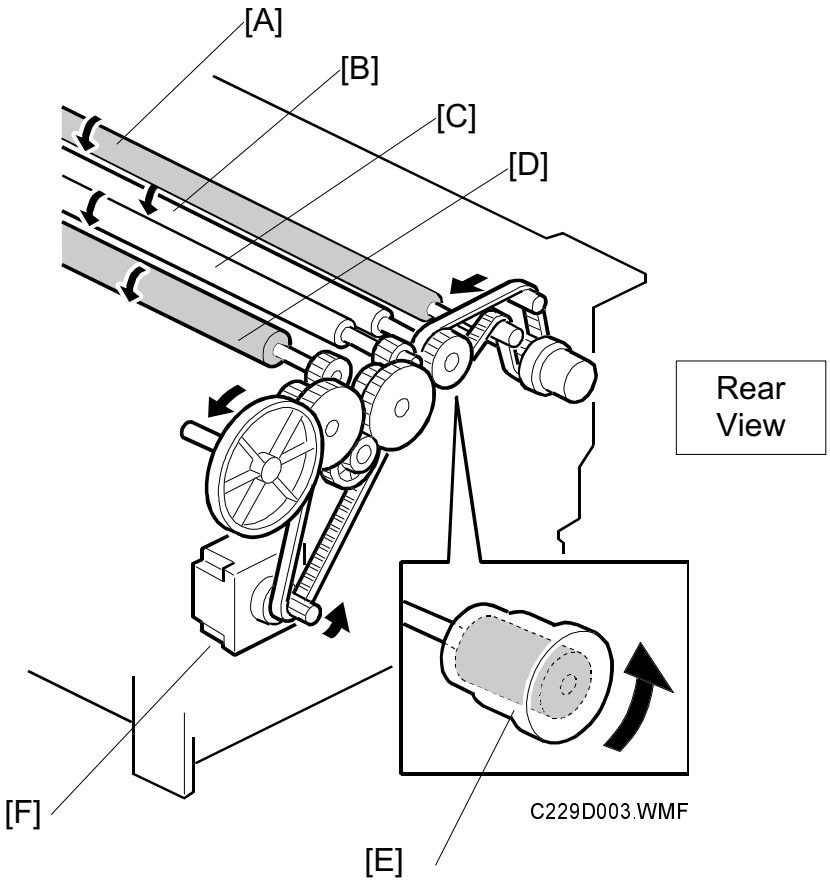
There is a solid-fill black area at the end of the master roll. When the master end sensor [D] detects this area, the operation panel displays the master end message.



C229D104.WMF

2.4.3 MASTER MAKING AND FEED MECHANISM

Master Feed Mechanism



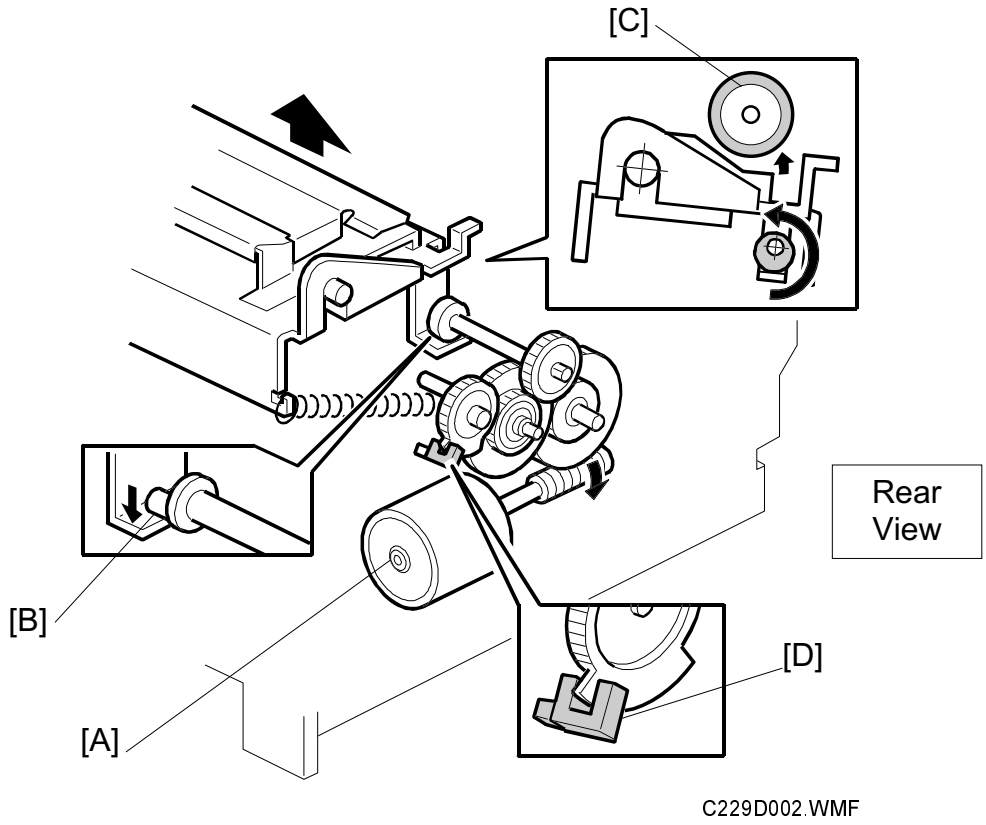
The master feed motor [F], a stepper motor, drives the master feed control [A], tension [B], platen [C] and master set [D] rollers.

The tension roller feeds the master slightly faster than the platen roller, to prevent the master from creasing. Therefore, the master between the platen roller and thermal head is always under tension.

There is a torque limiter [E] built into the tension roller drive gear. This allows the tension roller to become free from the master feed motor drive when the master is under excessive tension, to prevent damage to the master.

NOTE: Strips of mylar under each master feed roller prevent the master from being wrapped around the rollers. Be careful not to damage or set the mylars in the incorrect position because they damage easily. For details, refer to the Replacement and Adjustment section.

Platen Roller Pressure Release



The platen release motor [A] gives half a turn to the platen release cam [B] to apply or release the platen roller [C] pressure. As the motor turns, the actuator on the gear interrupts the platen release sensor [D]. When the pressure is released, the actuator interrupts the sensor.

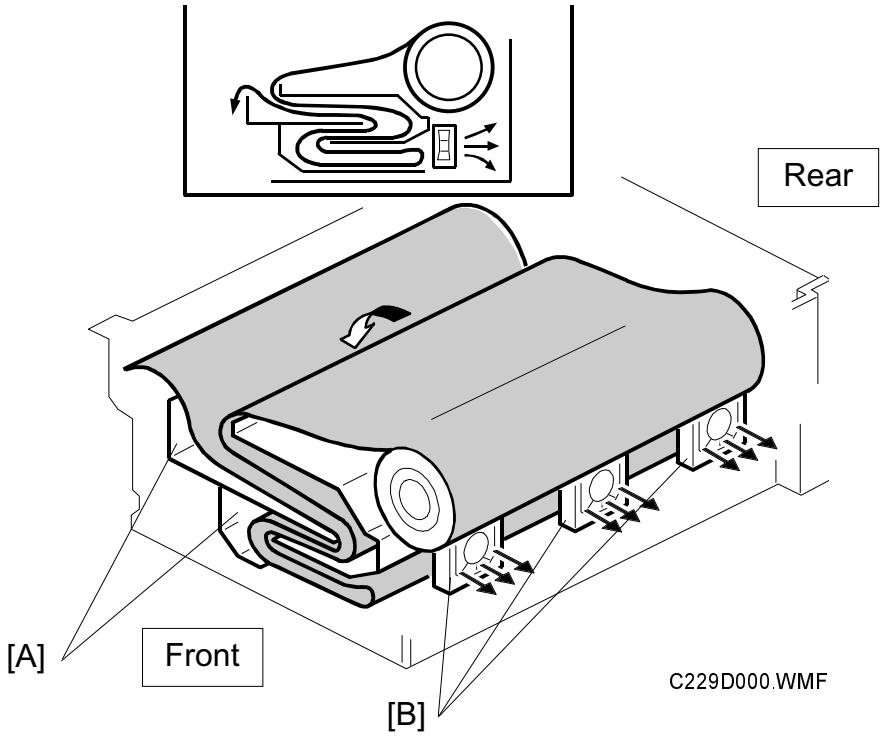
NOTE: When installing the gear with the actuator, remember that the setting position depends on the platen release cam position. For details, refer to the Replacement and Adjustment section.

Just before master making, the platen release motor starts turning until the sensor is inactive; this indicates that the platen pressure is now applied to prepare for master making.

When master making is complete, the motor turns again until the sensor is activated, releasing the platen pressure. This allows the user to remove a jammed master. Also, in standby mode, there is no pressure between platen roller and thermal head, so that the user can take out the master.

As explained in “Master Feed and Stop Control,” the platen roller pressure is repeatedly applied and released to prevent master skew or creasing after a roll has been put in the machine. To do this, the motor continues turning for 3 seconds.

Master Buffer Mechanism



To minimize master processing time, the master is stored in the master buffer duct [A] after the thermal head transfers the image to it. The stored master is fed out from the duct when the drum reaches the master making position after master ejecting.

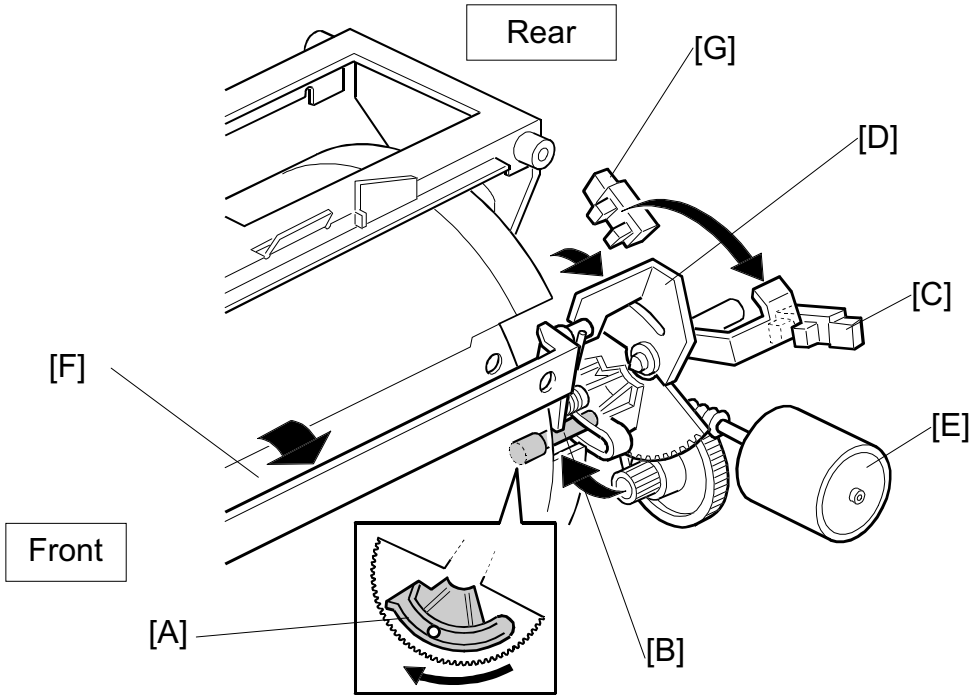
The master buffer duct is located under the master feed path. A two-level chamber inside the duct can hold a sufficient length of the master for A3 printing.

As soon as master making starts, the three master vacuum fans [B] start turning, creating suction to guide the master into the duct [A]. At this time, the master feed control roller has already caught the leading edge of the master. This roller does not start turning until the drum reaches the master making position and the master clamper opens (because the master feed clutch disconnects the master feed motor drive).

The master is fed while the thermal head writes the image on it. As the leading edge of the master stops, the suction guides the fed master into the master buffer duct and stores it as shown in the above diagram.

When the drum comes to the master making position, the master feed control roller starts turning and feeds out the master that is stored in the duct.

2.4.4 WRAPPING THE MASTER AROUND DRUM



Drum Lock and Master Clamper Open

As explained in the Master Eject section, the drum guide [A] holds the drum at the master eject and master making positions.

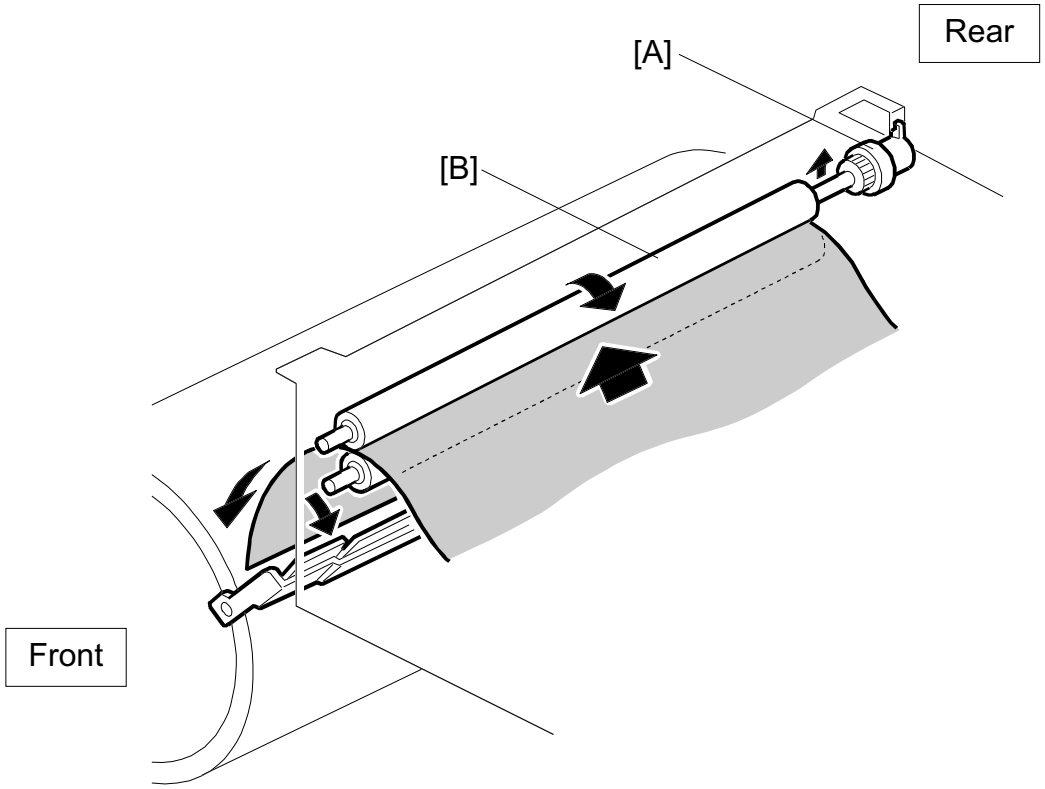
When the drum reaches the master making position, the drum guide moves to engage the stud [B] on the rear drum flange until the clamper open position sensor [C] is actuated. (The other stud was used for the master eject position.)

The master clamper opening arm [D] is just above the drum guide. The arm is different from the one used for opening the master clamper at the master eject position. The clamper motor [E] drives the arm and opens the master clamper [F], in synchronization with the drum guide movement.

The drum guide moves (to open the master clamper) until the clamper open position sensor is interrupted by the feeler. Then it stops immediately (unlike at the master eject position of the drum) as shown in the diagram.

Before the drum starts turning to start wrapping the master on the drum, the drum guide returns to the home position until the clamper close position sensor [G] is activated. The master clamper opening arm also returns, closing the master clamper.

Master Feed Control Roller Mechanism

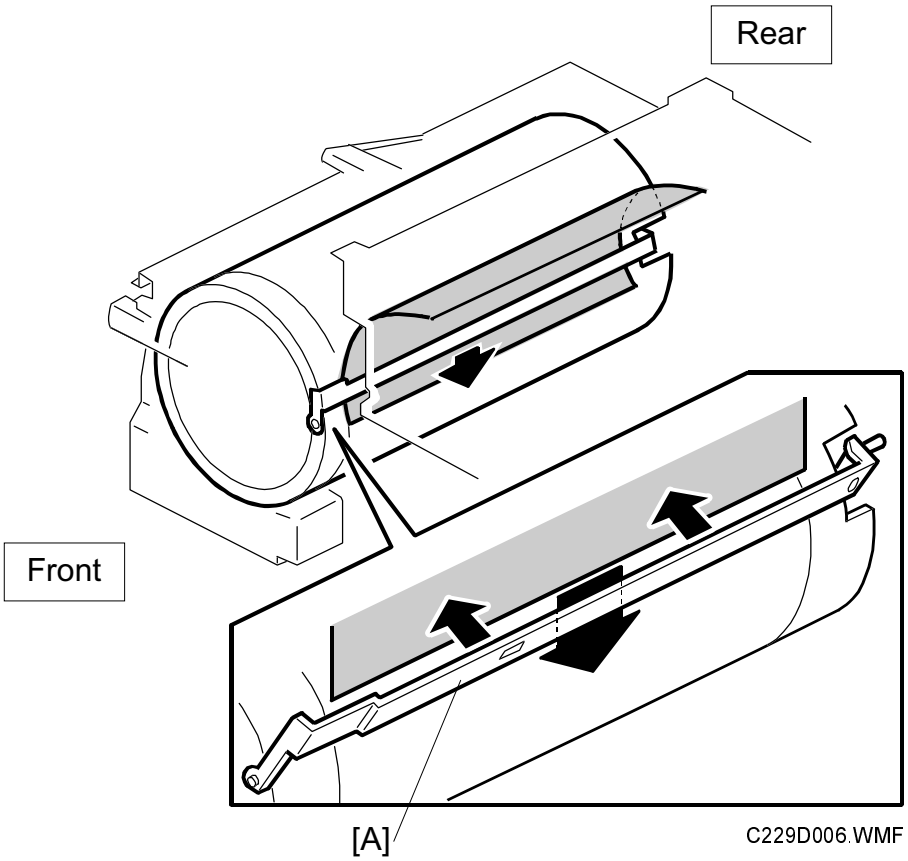


C229D090.WMF

The master feed clutch [A] connects and disconnects the drive from the master feed motor to the master feed control roller [B]. The master feed control roller only turns in the following cases:

- When a master roll is put in the machine, the master is fed until the master feed control roller catches the leading edge of the master.
- During master clamping, the master feed control roller turns and sends the leading edge to the clamper position.
- While the master is being wrapped around the drum, the master feed control roller turns to feed the master, in synchronization with the drum rotation.

Master Clamping and Wrapping around the Drum



The master feed clutch turns on to feed out the master from the master buffer duct. The master is fed out 31 mm and reaches the drum master clamper [A]. The master feed clutch turns off temporarily.

The master clamper is closed and the drum starts turning to wrap the master around the drum. At the same time, the master feed clutch turns on again to feed the master, synchronizing it with the drum rotation.

When master making is complete and the master is stored in the master buffer duct, the drum turns continuously to wrap the master. The cutter cuts the master when there is no master left in the duct, and the master at the cutter is stretched tightly; this ensures a clean cut.

A sheet of paper, called the trial print, is fed at the same time as the master wrapping. To ensure that ink transfers to the master on the drum, the drum rotates at its lowest speed (16 rpm). This ensures that the print run starts up with a sufficient ink density.

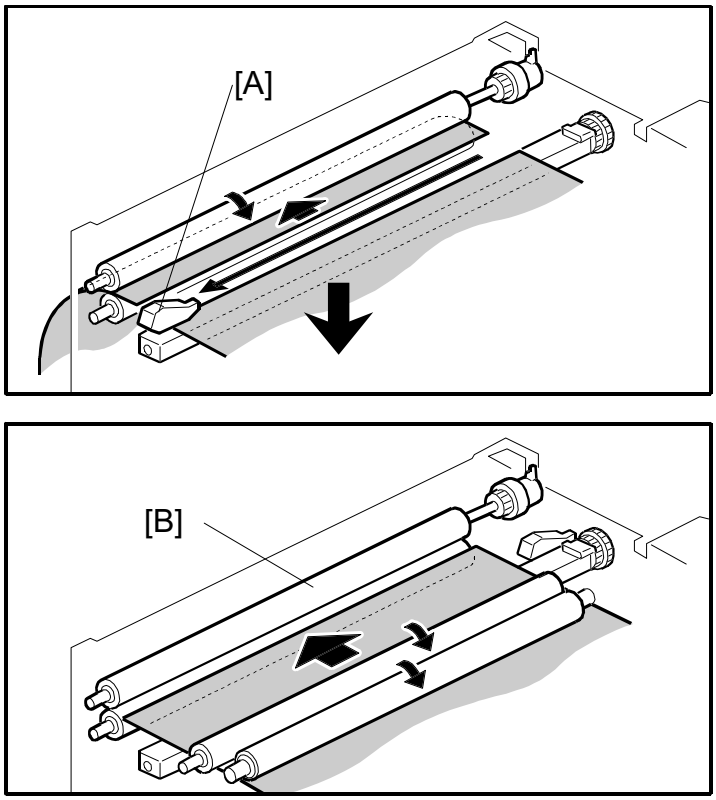
The drum then returns to the home position, ready for printing.

Master Cut and Buffer Duct Entrance Control

When the thermal head has finished making the master and the master has been fed out of the duct, the cutter [A] will cut the master.

In preparation for making the next master, the leading edge of the next master is continuously fed to the master feed control roller [B].

The new master is fed 32 mm past the cut position and stopped.

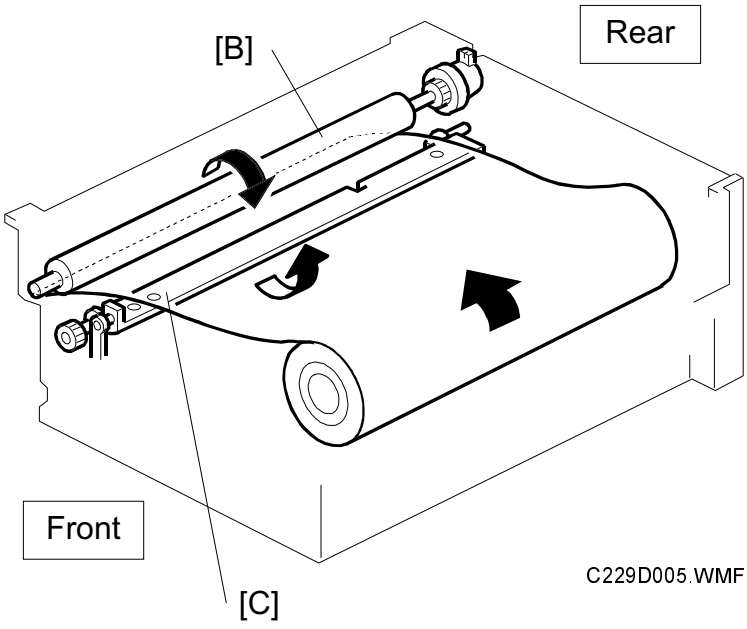


C229D105.WMF

NOTE: As explained in "Master Feed and Stop Control in 2.5.2 Master Set Mechanism," the master edge sensor only controls the master stop position at the master feed control roller after a roll is put into the machine.

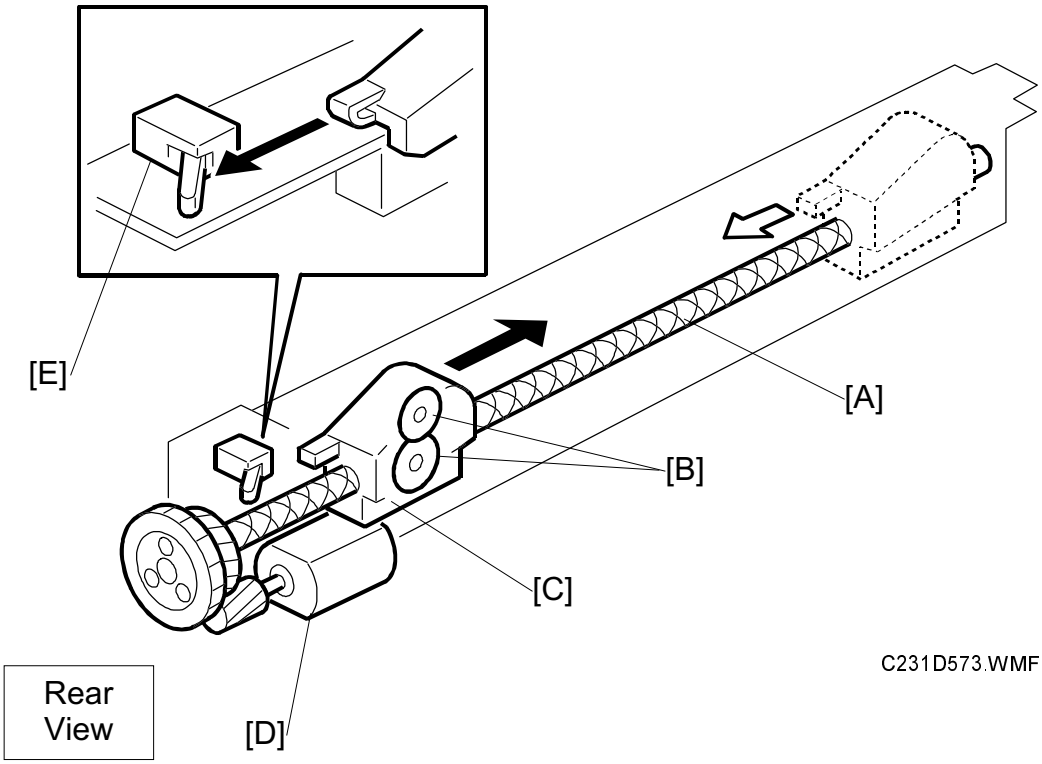
The duct entrance plate stays open, except in the following two cases. To close off the duct, the duct entrance solenoid closes the master buffer duct entrance plate [C].

- While the leading edge of the next master is being fed to the master feed control roller [B]
- After a roll is put in the machine (as explained in "2.5.2 Master Set Mechanism").



C229D005.WMF

Cutter Mechanism



The cutter motor [D] drives the screw shaft [A], moving the cutter holder [C] forward and backward.

There are two cutter blades [B] in the holder. While the cutter holder [C] travels to the front (the operation side of the machine), the blades cut the master. The cutter motor keeps turning in one direction. However, the cutter holder returns to the home position when it reaches the front end of the cutter unit because of the two different spirals threaded on the screw shaft [A].

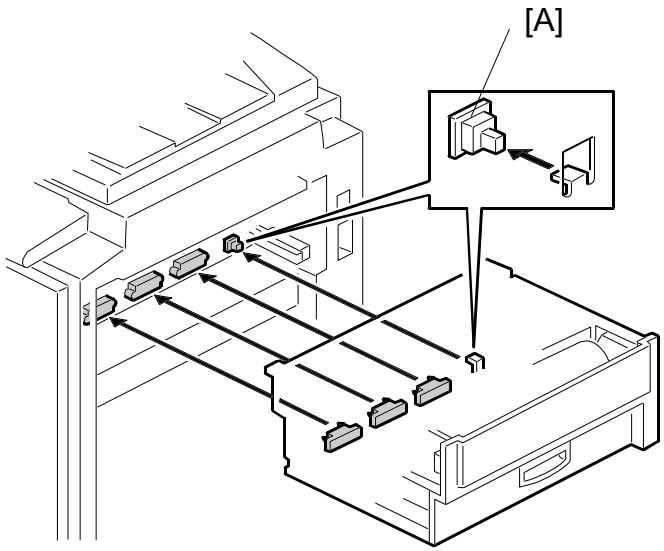
When the cutter holder reaches the home position, the cutter home position sensor [E] is activated by the holder and the motor stops.

2.4.5 MASTER MAKING UNIT SLIDE-OUT MECHANISM

The master making unit can be slid out along the guide rails.

There are three connectors, which enable electrical contact for the installed unit.

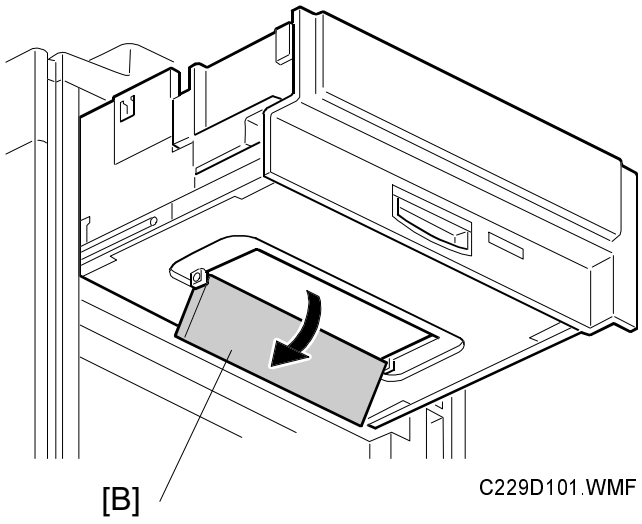
The master making unit set sensor [A] (a push switch) detects when the unit is out. The operation panel displays a message in this case.



C229D100.WMF

2.4.6 OPENING DOOR FOR MISFED MASTER REMOVAL

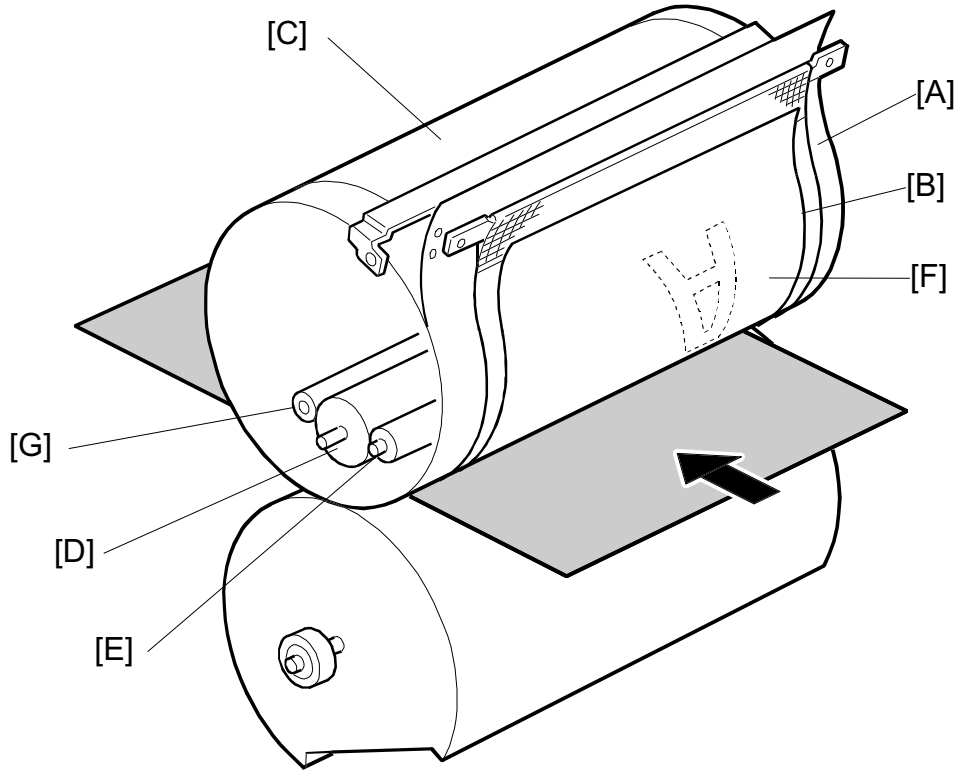
There is a jam removal dial to manually rotate the master feed rollers. If pieces of the master remain in the master buffer duct, open the door [B] to remove them. Normally, pieces of master do not remain in the duct. Therefore, the door is only for emergency cases.



C229D101.WMF

2.5 DRUM

2.5.1 OVERVIEW

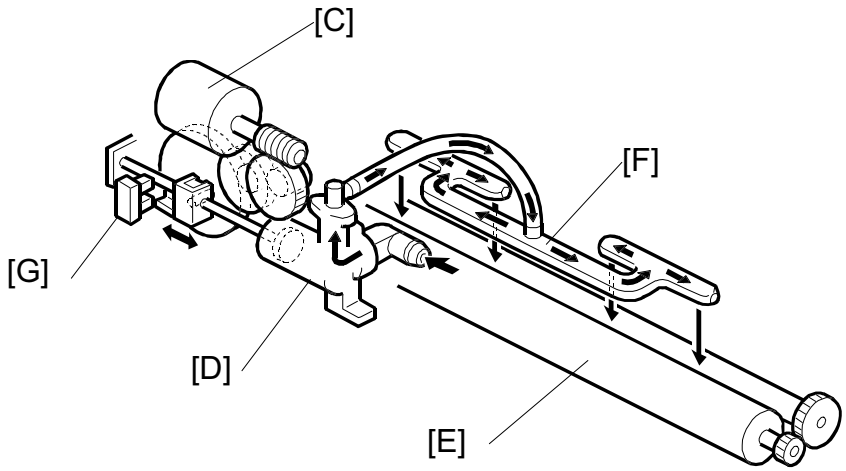


The drum surface is composed of a stainless-steel screen (metal screen [A]) and two layers of polyester screens (cloth screen [B]). In addition, a drum master clamper [C] clamps the leading edge of the master wrapped around the drum.

Inside the drum are the ink roller [D] and doctor roller [E], which create a precisely maintained gap, known as the doctor gap, to supply a thin layer of ink on the screens and master [F].

This machine uses the drum idling roller [G] to supply ink onto the screens and master before printing. The length of time the machine was not in use determines the idling supply time. This ensures that the first print will have sufficient ink density even after the machine was not used for a long time.

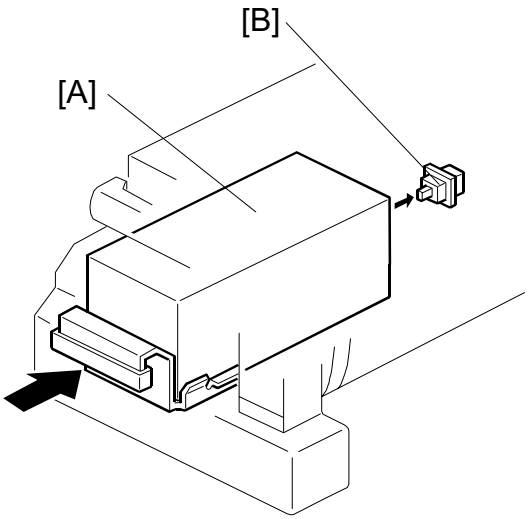
2.5.2 INK SUPPLY AND KNEADING MECHANISM



C229D010.WMF

Ink Cartridge Installation

The ink cartridge [A] is in the drum. The ink cartridge set sensor [B] (a push switch) detects the presence of the ink cartridge.



C229D009.WMF

Ink Supply Mechanism

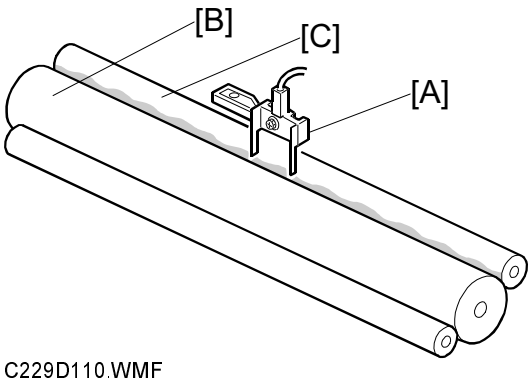
The whole ink supply mechanism is inside the drum. The ink pump motor [C] drives the ink pump [D], supplying ink from the ink cartridge to the ink roller [E] via the ink distributor [F].

Ink Pump Operation Monitoring

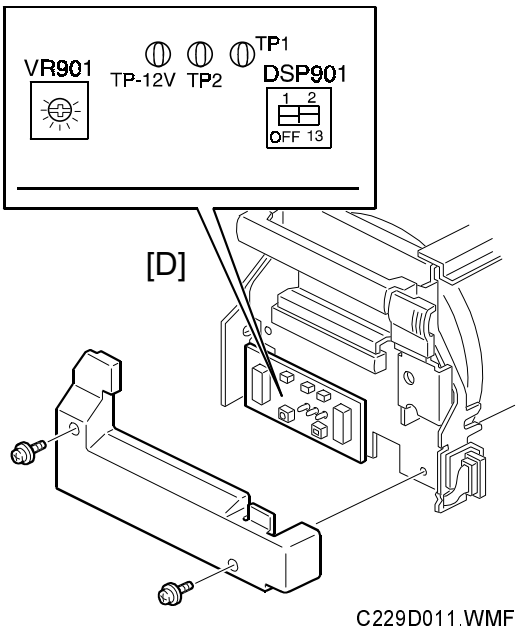
The ink pump sensor [G] monitors the number of pumps the ink pump piston lever makes. The feeler on the piston lever activates the sensor at each complete turn of the piston.

SP1-5 can be used to check the number of ink pump revolutions.

Ink Detection Board



C229D110.WMF



C229D011.WMF

Ink Detection Mechanism

The ink detecting pins [A] function as a capacitor electrode and detect the capacitance between the ink [B] and doctor [C] rollers. The capacitance level changes with the ink level. When the ink level is high the pins touch ink, and the capacitance increases. When the ink level is low the pins do not touch the ink and the capacitance therefore decreases. Consequently, by detecting the capacitance between the pins, the ink supply motor maintains the ink level.

If the pins detect an insufficient amount of ink after activating the ink pump motor for 40 seconds, a "no ink condition" is detected. Guidance is displayed on the operation panel.

NOTE: The ink supply mode is useful when installing a new drum. When the “Economy Mode” key is pressed while holding down the “0” key, the drum turns 40 rotations, to supply ink inside the drum.

The ink detection board [D], which includes the ink detection circuit, is also inside the drum. There are test pins (TP's) and a potentiometer (VR901) for ink detection adjustment.

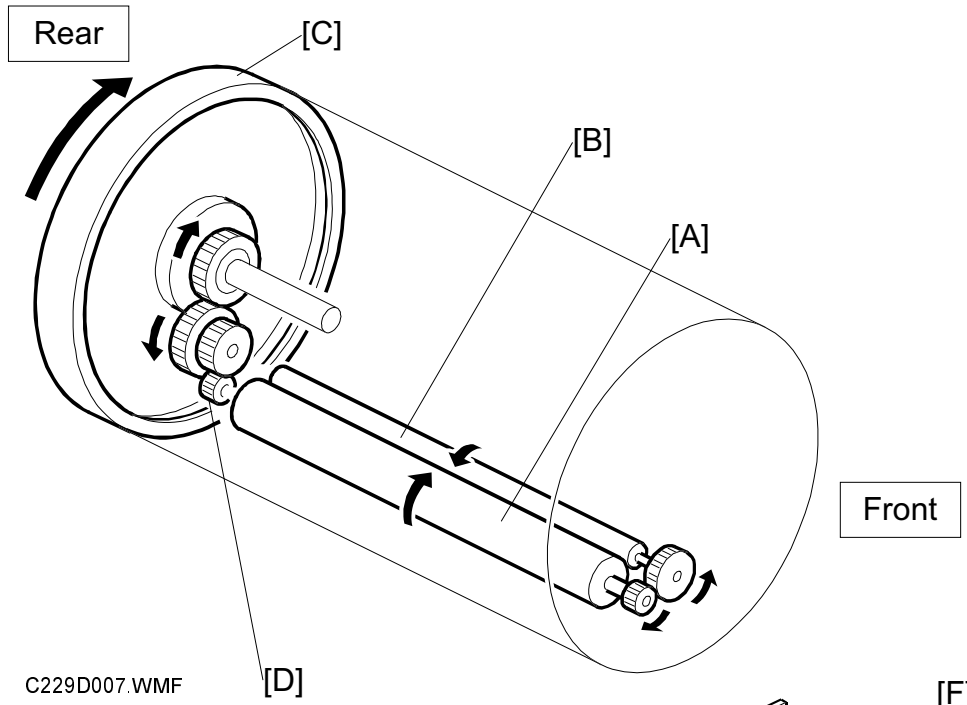
Drum Type Detection

There are also dip switches on the ink detection board. The settings depend on the drum type in the following manner:

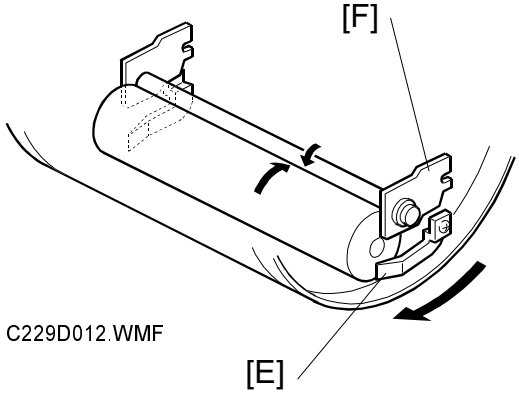
DPS901	-1	-2
Standard Drum	ON	ON
Optional Color Drum	OFF	ON
Optional A4 Drum	ON	OFF
Not Used	OFF	OFF

Note: If the CPU detects that all dip switches are off, it assumes that there is no drum in the machine.

Ink Kneading Mechanism



C229D007.WMF



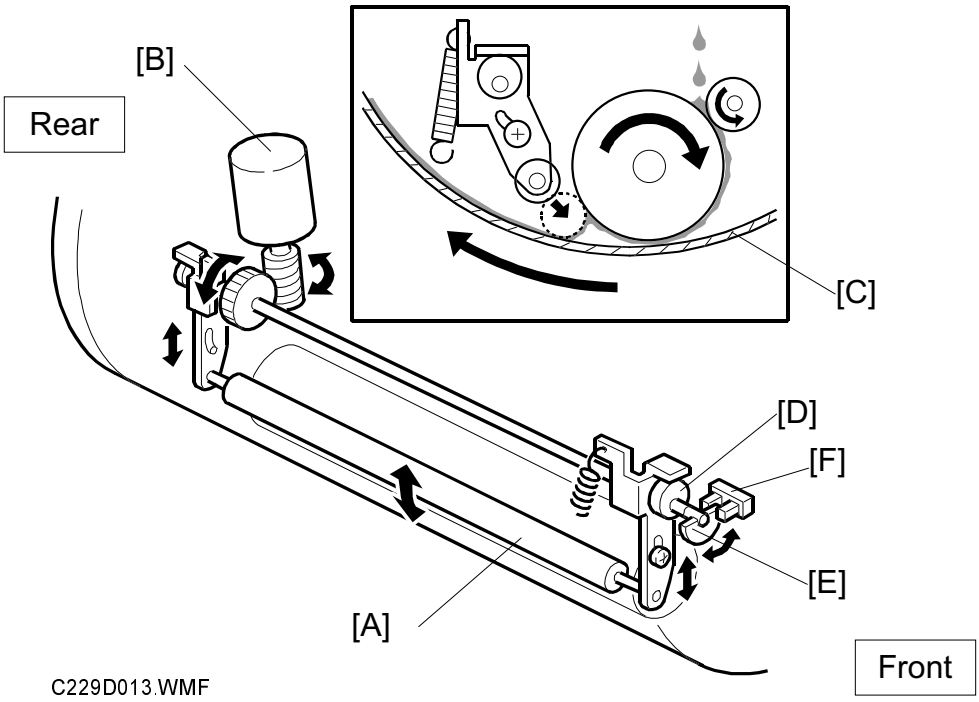
C229D012.WMF

A gear [C] on the drum shaft drives the ink [A] and doctor [B] rollers. The doctor roller spreads the ink evenly on the ink roller. The ink roller drive gear [D] has a one-way clutch to prevent the ink roller from being manually turned in the reverse direction.

The ink roller only touches the screen during the printing process. During the printing process, ink passes to the paper through holes in the screens and the master. This is because the pressure cylinder below the drum holds the drum screen and the master against the ink roller during printing.

The ink roller blade [E] and separation plate [F] scrape off ink build-up on both ends of the ink and doctor rollers.

Drum Idling Mechanism



Quality Start Mode

In Quality Start mode; the machine enters the drum idling mode before printing. This ensures that the first print has sufficient ink density even if the machine was not used for a long time.

The user selects Quality Start mode by pressing a key on the operation panel. The number of idling rotations is fixed at 45. However, SP3-90 can change this number.

NOTE: In Quality Start mode; the drum idling motion starts, before printing, when the Start key is pressed. However, if there is no master on the drum, drum idling is not performed.
Even if the Quality Start mode is active, and there is no master on the drum, drum idling is skipped although the LED on the operation panel turns on. When printing for the next original starts, the machine enters drum idling mode if a large enough master is wrapped around the drum (it will not be done for an A4 master on an A3 drum).

The drum idling roller [A] puts the ink onto the screens and master before printing. The idling roller motor [B] turns to press the drum idling roller against the inner surface of the drum screen [C]. The spring tension supplies additional force for this.

The cam [D] is turned by the motor, moving the drum idling roller towards the drum screen. The actuator disk [F] interrupts the idling roller HP sensor [E] when the drum idling roller is being used.

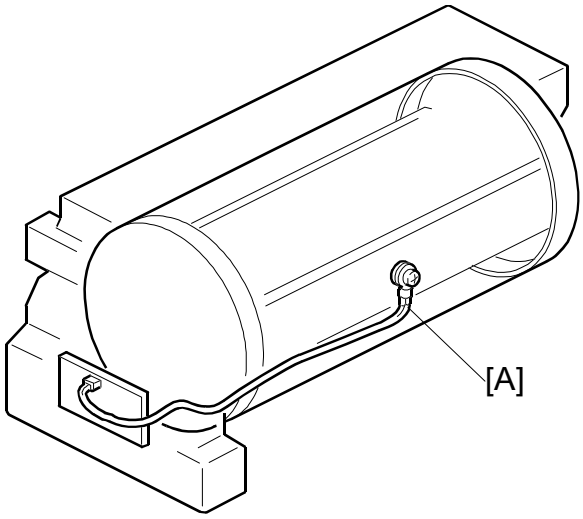
Auto Quality Start Mode

Auto Quality Start is done if the user does not select Quality Start mode. (It can be disabled with a user tool.)

In Auto Quality Start mode, the idling motion depends on how long the machine was not in use and on the temperature detected by the thermistor [A] in the drum.

The CPU detects a low temperature condition if the thermistor [A] reports approximately 15 °C or lower. If the detected temperature is 28 °C or higher, it is a high temperature condition.

The number of drum idling rotations depends on temperature and period of machine inactivity, as shown in the following table.



C229D111.WMF

NOTE: SP3-91 to 3-93 can change the number of rotations for each of these conditions.

Period/ Temperature	Less than 4 hours	4 to 24 hours	24 to 72 hours	Over 72 hours
High (28 °C or higher)	0	0	0	15
Normal (15 to 28 °C)	0	0	15	15
Low (15 °C or lower)	0	15	45	45

NOTE: The drum rotation speed during idling is fixed at 90 rpm.

Drum Rotation Speed during Idling

Whether the machine is in Quality Start mode or not, the drum idling roller is always used for the trial print (the print to complete the master making), and for the first and second prints. If a low temperature condition is detected, the drum idling roller is also used for the third print.

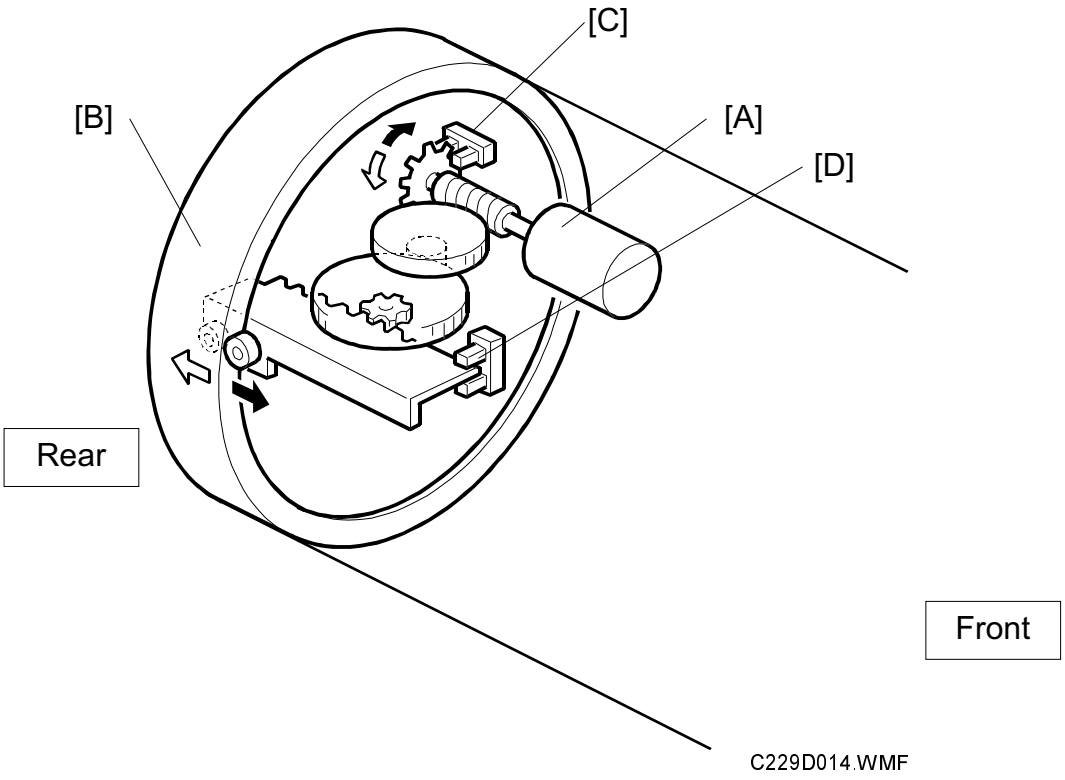
The drum rotation speed varies during this mode as shown in the table below.

- Change of drum rotation speed (rpm) with temperature -

Temperature	Trial Print	1st Print	2nd Print	3rd Print	4th Print	5th Print	6th Print	7th Print
Normal or High (above 15 °C)	16 Idling Roller On	30 Idling Roller On	60 Idling Roller On	75 Idling Roller Returned	90	105	120	120
Low (below 15 °C)	16 Idling Roller On	16 Idling Roller On	30 Idling Roller On	60 Idling Roller On	75 Idling Roller Returned	90	105	120

NOTE: These figures apply to the highest printing speed (speed 5, which is at 120 rpm).

2.5.3 DRUM SHIFT MECHANISM FOR IMAGE SIDE-TO-SIDE SHIFT



The image side-to-side shift function shifts the outer drum sleeve (with master) from front to back.

The shifting mechanism is inside the drum. It consists of the drum shift motor [A] and a rack and pinion mechanism.

The motor can turn in either direction by the image shift amount set at the operation panel. The motor moves the rear drum flange [B] via the rack and pinion, as shown. At the same time, it rotates the pulse disk. This allows the drum shift sensor [C] to generate pulse signals for sending to the CPU. The CPU detects the amount of shift with these signals and controls motor on/off time.

The maximum shift range, in both directions, is 10 mm from home position. The drum shift HP sensor [D] ensures that the outer drum sleeve returns to the home position.

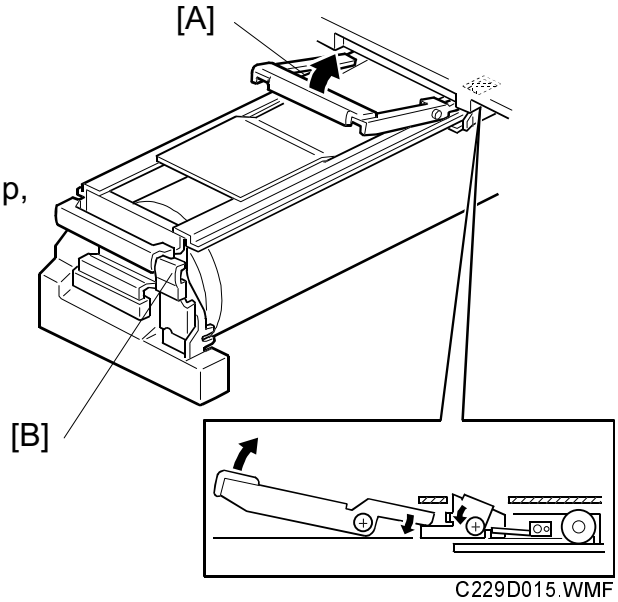
When the outer sleeve returns to the home position, it activates the sensor, stopping the drum shift motor.

2.5.4 DRUM SET MECHANISM

Upper Handle and Lock

There are two grips [A, and B] to hold the drum.

When the upper grip [A] is pulled up, it releases the drum locking mechanism.



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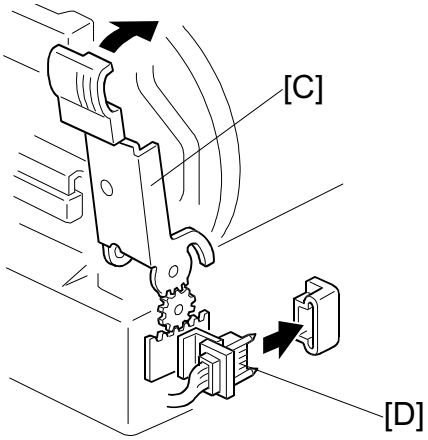
Front Lock Lever

When the drum is set correctly and the front lever [C] is raised, the drum is locked into position. The connector [D] allows electrical contact for the drum components.

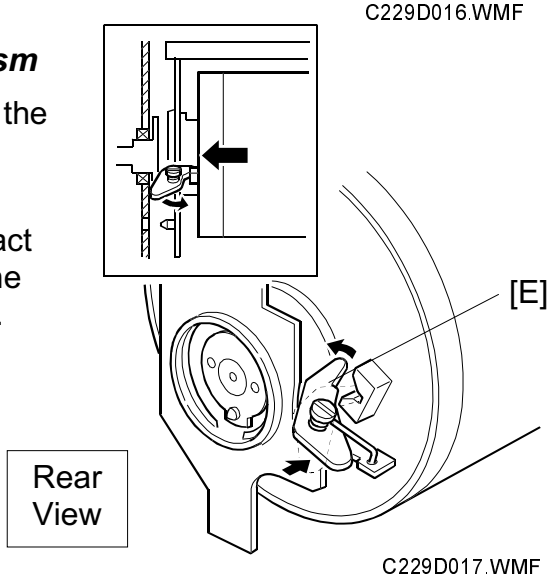


C229D016.WMF

Drum Rotation Lock Mechanism

The rotation stopper [E] prevents the drum from turning when it is removed from the machine.

When the drum is replaced, contact with the rear frame disengages the stopper [E] and releases the lock.



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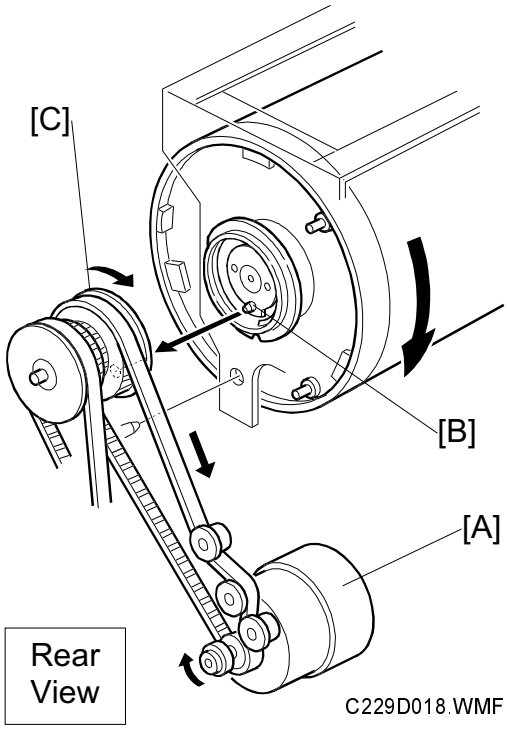
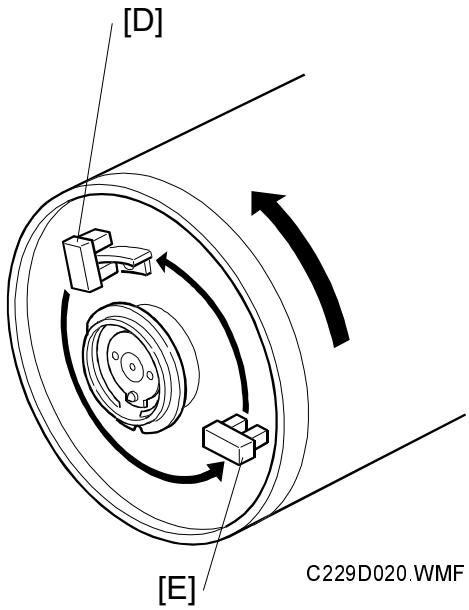
2.5.5 DRUM DRIVE MECHANISM





The main motor [A] drives the drum via the timing belt. When the drum is set in the machine, the stud [B] on the joint disk engages the drum drive gear [C]. This transmits the main motor drive to the drum unit.

The main motor [C] has an encoder to send pulses to the main motor control board. The CPU monitors the pulses and controls the drum speed and stop positions. The 1st and 2nd drum position sensors [D, E] check the position of the drum. The actuator on the rear drum flange activates these sensors as the drum turns.

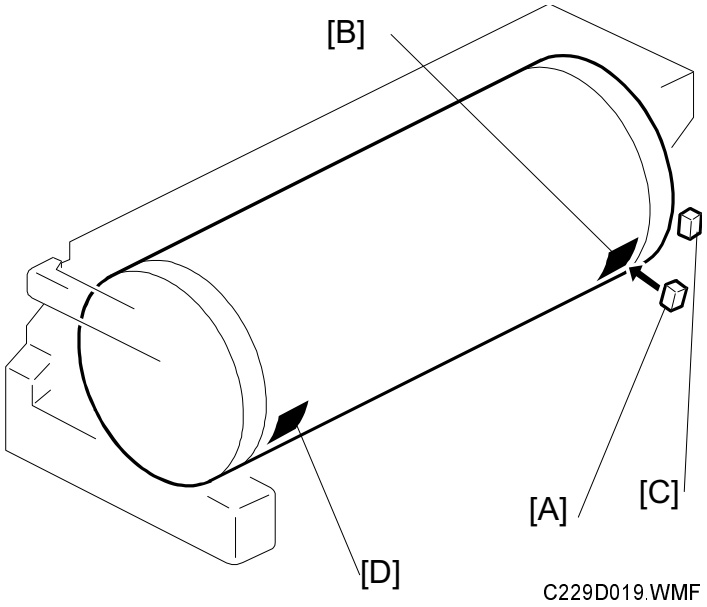
There are three drum stop positions: home, master eject, and master making. The CPU starts counting the main motor encoder pulses when these sensors are activated. Certain pulse counts are assigned to each drum stop position. The CPU can stop the drum at the desired positions.

At the home and master making positions, the drum de-actuates the relevant sensor. This ensures that the drum stops in the exact position, even after high-speed rotation. The 1st drum position sensor corresponds to the home position and the 2nd drum position sensor corresponds to the master making position.

2.5.6 MASTER DETECTION

The 1st drum master sensor [A] detects a master on the drum.

If a master is on the drum, the black patch [B] is covered and the sensor detects the light reflected from the master. Printing starts when the start key is pressed. If an original has been set, the master is ejected before making a new master.



If no master is on the drum, the black patch is exposed. The black patch does not reflect light back to the sensor. The machine will skip the master eject process and immediately begin making a new master.

A similar sensor, the 2nd drum master sensor [C], is located just above the 1st drum master sensor. This sensor determines if the master making process correctly wrapped the master around the drum.

The drum starts turning soon after the drum master clamper clamps the leading edge of the master. The 2nd drum master sensor checks for the presence of the master (master clamping error check). If a master is not detected, a clamping error occurred. The master feed stops, the drum returns to the home position, and the machine displays a master feed jam message.

The 1st drum master sensor cannot check for master clamping errors, because the black patch has moved.

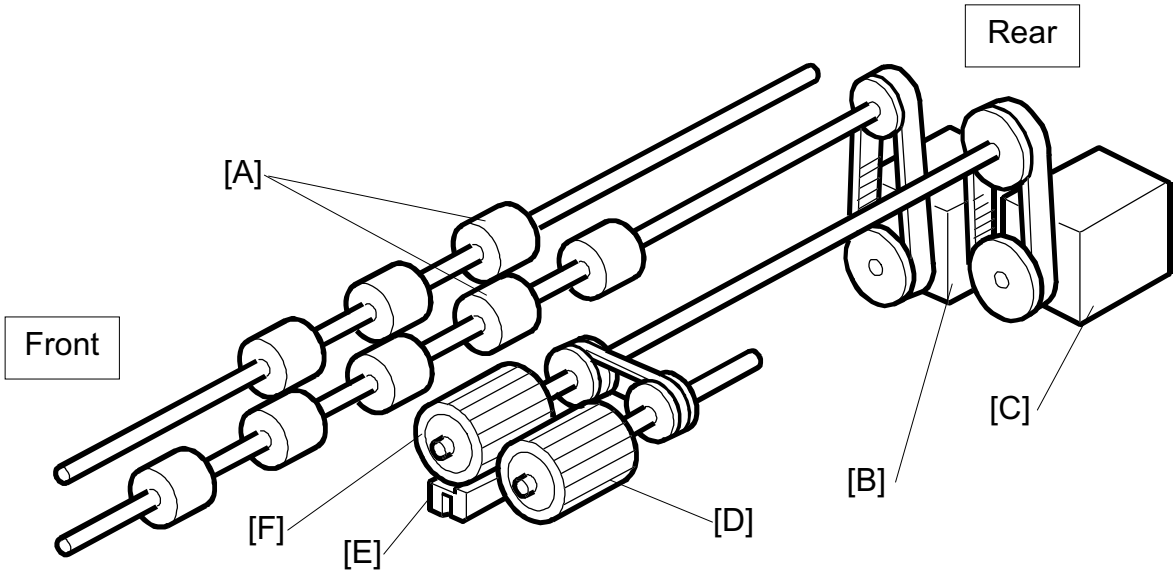
Both sensors use the same black patch [B] to detect the master.

NOTE: There are two black patches on the drum screen. Patch [D] does not face the drum master sensors and is not used for master detection.

The surface of the patches is slightly higher than the surface of the rest of the drum screen. The extra patch ensures that the master pick-up roller contacts the drum surface evenly at this part of the drum, resulting in even pressure from the roller all across the drum.

2.6 PAPER FEED

2.6.1 OVERVIEW



Pick-up and Feed

The top sheet of paper on the paper table is first fed by the pick-up roller [D]. Then, it is separated by the paper feed roller [F] and the friction pad [E], and fed to the registration rollers [A]. The upper and lower registration rollers feed the sheet to the drum.

An independent stepper motor (the paper feed motor [C]) drives the pick-up roller and paper feed roller. This allows more precise control than the usual main motor/magnetic clutch system.

Feed/Separation Pressure

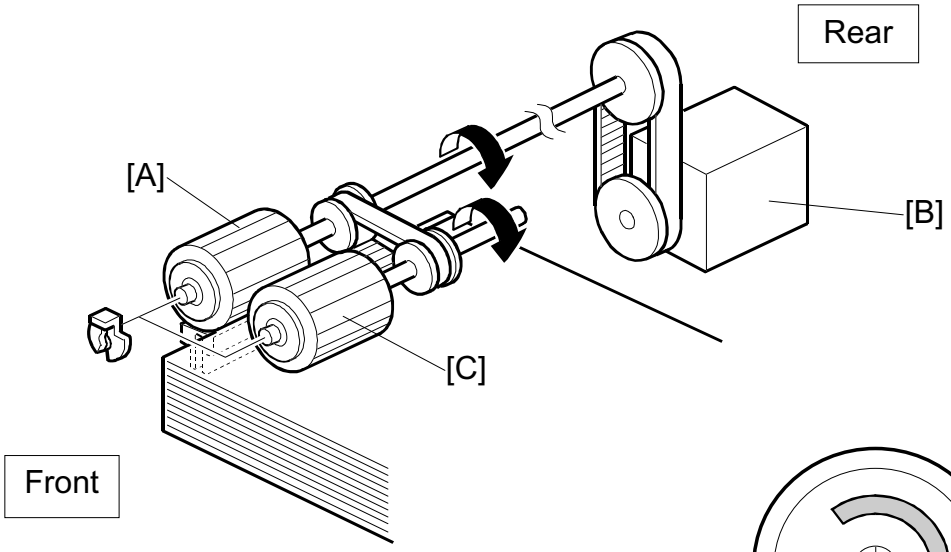
The strength of the paper feed roller and the friction pad pressure against the paper depend on the paper type selected at the operation panel. Each component has a separate dc motor to adjust the pressure. The operator is free from complicated adjustments for paper feed and paper separation pressures.

Registration

Also, an independent stepper motor (the registration motor [B]) controls the registration roller. The registration roller synchronizes paper feed timing with the image on the drum. The registration roller starts rotating after the paper has come in contact with the rollers and has been aligned.

Paper feed timing around the registration roller is monitored by two different photo-sensors. One is located before the registration roller, and the other is after the registration roller. These sensors are also essential for paper feed control.

2.6.2 PAPER FEED MECHANISM



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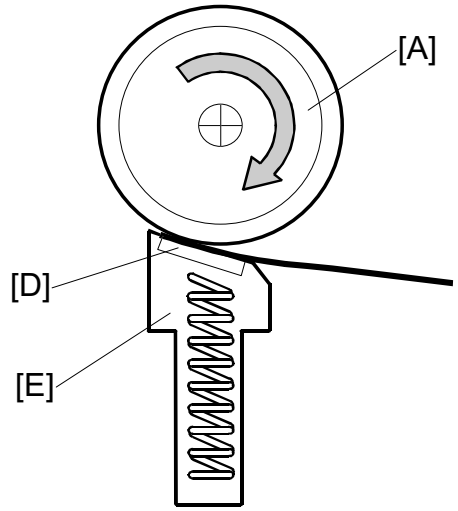


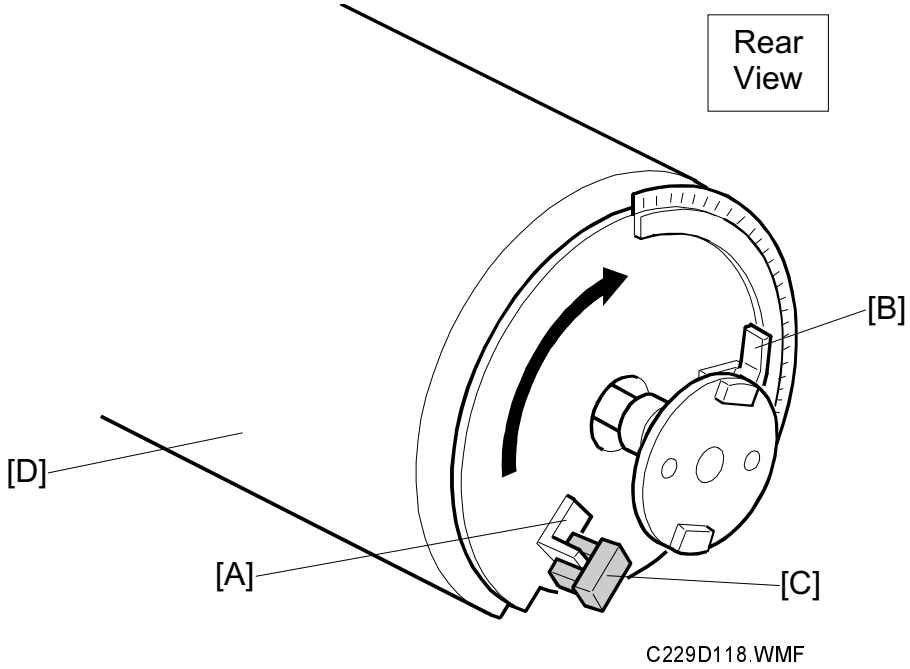
C229D056.WMF

The pick-up roller [C] and paper feed roller [A] are driven by the paper feed motor [B] as shown.

The top sheet of the paper is separated from the paper stack by the friction between the roller and the friction pad [D], and fed to the registration roller.

The friction pad [D] is mounted on a block [E], and spring pressure is applied to this block. As explained later, the spring pressure is changed by a dc motor to adjust the paper separation pressure.

There is a one-way clutch in the paper feed roller. When the roller stops and paper is fed by the registration rollers, the one-way clutch ensures that the paper feed roller does not resist the paper feed.



Since paper feed timing must be synchronized with pressure cylinder rotation (so that the paper clamper on the pressure cylinder can catch paper's leading edge accurately), the paper feed motor on timing is maintained by the feed start sensor [C].

A short time after the pressure cylinder [D] starts rotating, the actuator [A] on the rear of the pressure cylinder activates the sensor. After a pre-determined duration, the paper feed process begins (this time will vary with the printing speed).

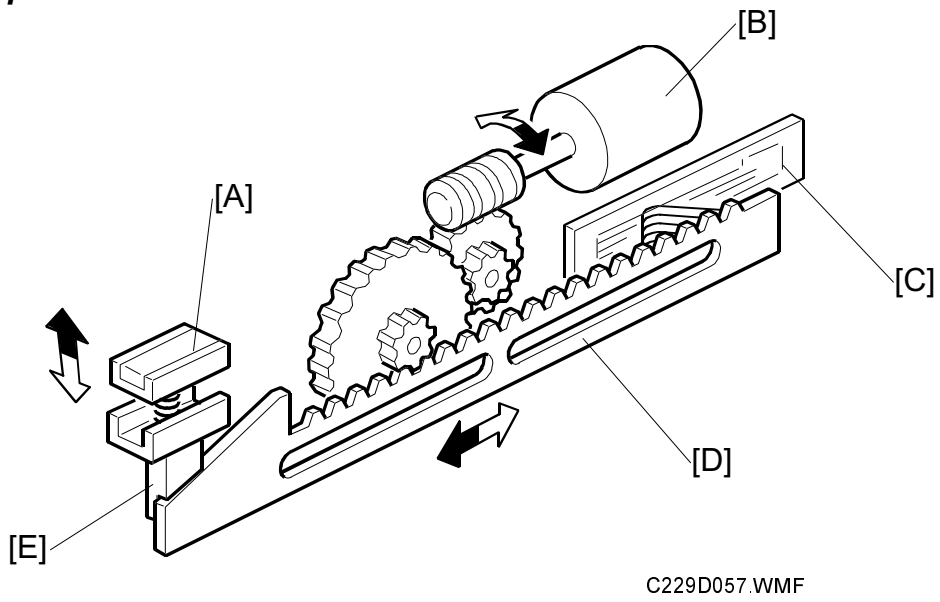
NOTE: There are two actuators: [A] and [B]. The actuator [B] is used to maintain the registration motor start timing.

2.6.3 PAPER FEED/SEPARATION PRESSURE ADJUSTMENT MECHANISM

Overview

The paper separation pressure and the paper feed pressure depend on the paper type selected at the operation panel. When the paper type is changed, two dc motors automatically turn to change the pressure settings.

Paper Separation Pressure

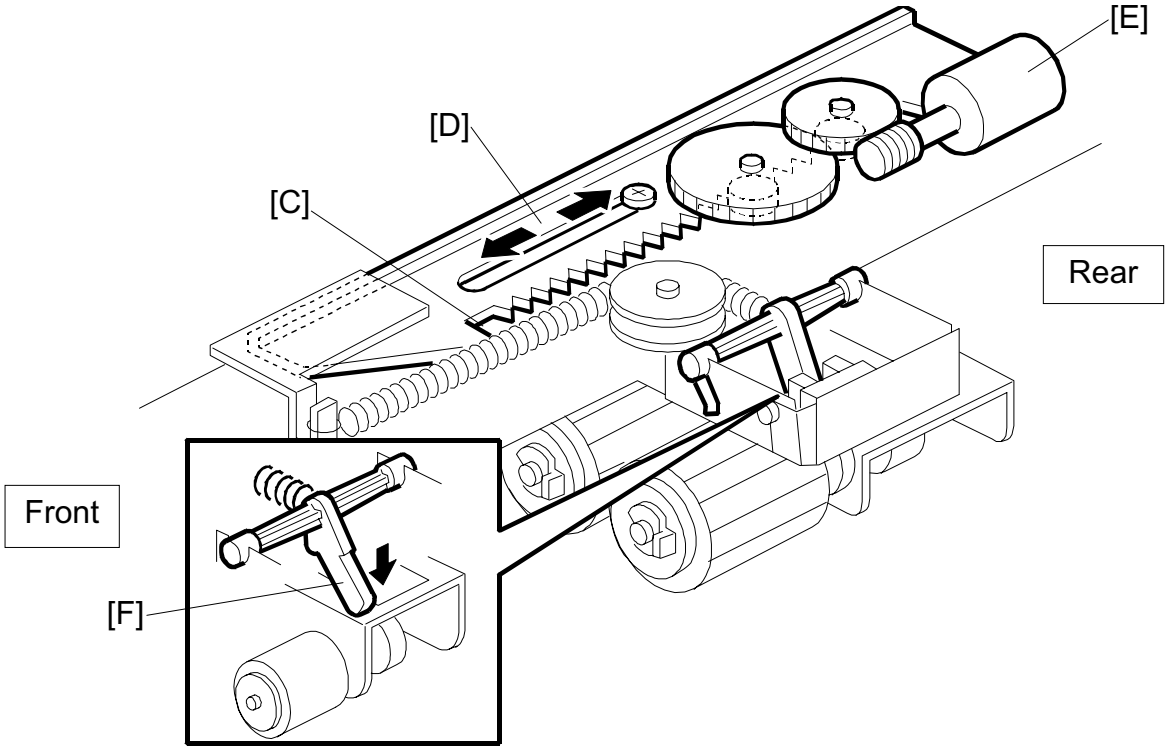


The paper separation pressure is applied from the bottom of the friction pad block [A] by a spring on the friction pad base [E].

The direction of the paper separation pressure motor [B] turn depends on the signal from the CPU. The rack [D] moves from side to side, moving the friction pad base up or down. This changes the spring pressure against the friction pad block.

The position of the rack [D] is detected by the separation pressure detection board [C].

Paper Feed Pressure



C229D055.WMF

The mechanism is similar to the separation pressure control mechanism.

The feed pressure motor [E] rotates, pulling or releasing the spring [C] through the rack [D]. The lever [F] moves up or down depending on the tension of the spring. If the spring is pulled, the lever moves upwards, reducing the paper feed pressure.

The position of the rack [D] is detected by the feed pressure detection board (not shown), in a similar way as in the paper separation pressure control mechanism.

Paper Types

The user can select the paper type before starting the job. The feed and separation pressures used for the job will depend on the selected paper type (the machine automatically adjusts these pressures to suit the selected paper type.

The possible paper type settings are standard, thick, and special. Two additional settings for paper types can be customized as 'user 1' and 'user 2'.

For the 'user 1' and 'user 2' paper types, the user can choose from 5 settings using a user tool. The user tool settings give the machine a rough idea of what type of paper the user is using as types User 1 and User 2. The five user tool settings are as follows.

- Standard, no feed (Standard paper type, non feed likely)
- Standard, double feed (Standard paper type, double feed likely)
- Thick, no feed (Thick paper type, non feed likely)
- Thick, double feed (Thick paper type, double feed likely)
- Thick, medium (Thick paper type, with intermediate chances of double and non-feed)

Pressure Settings for Each Paper Type

For each of these paper types (standard, thick, special, user 1, user 2), the user has two settings: ‘Misfeed’ and ‘Double Feed’. Each of these two settings has three possible values: Standard, Frequent, Very Frequent (the user selects one of these depending on how the machine is performing).

The pressures for each setting can be adjusted with SP mode (SP 6-90 to -99). The ‘feed pressure’ SP modes adjust the feed pressures applied for each of the user’s three possible ‘misfeed’ settings, and the ‘separation pressure’ SP modes adjust the separation pressures applied for each of the user’s three possible ‘double feed’ settings. For how to use these SP modes, refer to the Replacement and Adjustment section.

- SP6-90: Feed pressure, special paper
- SP6-91: Feed pressure, normal paper
- SP6-92: Feed pressure, thick paper
- SP6-93: Feed pressure, user 1 paper
- SP6-94: Feed pressure, user 2 paper
- SP6-95: Separation, special paper
- SP6-96: Separation, normal paper
- SP6-97: Separation, thick paper
- SP6-98: Separation, user 1 paper
- SP6-99: Separation, user 2 paper

Other Factors affected by the selected Paper Type

The paper type selected for a job also affects the paper delivery wing position, and whether the paper clamper on the pressure cylinder is used or not.

- SP6-100: Paper delivery wing position for standard, special, thick, user 1, and user 2 type paper
- SP6-101: Paper clamp enable/disable for standard, special, thick, user 1, and user 2 type paper

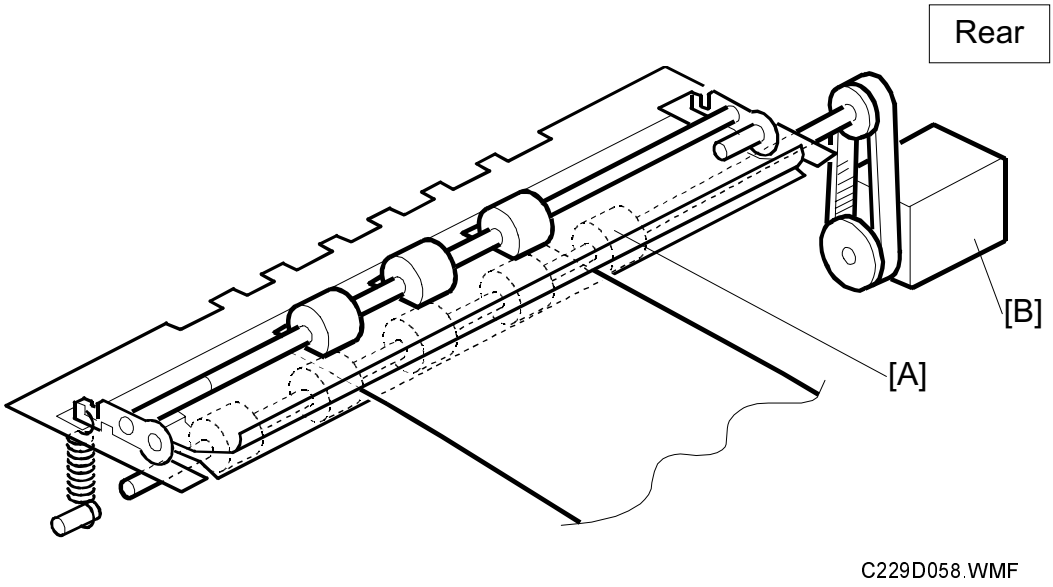
Default Settings

The following table shows the default settings for each paper type. For the pressure, the higher the SP mode value, the higher the pressure.

For details about the paper clamper, see 'Pressure Cylinder'. For details about the wing guides, see 'Paper Delivery'.

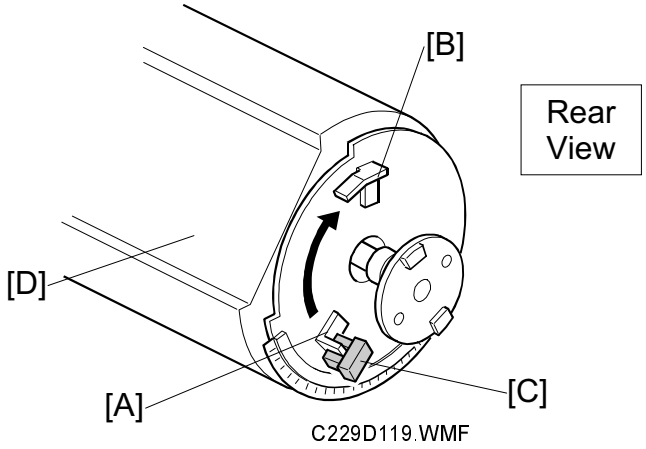
	Feed pressure			Separation pressure			Wing Guides	Paper Clamp
Paper Type	Std.	Freq.	V. Freq.	Std.	Freq.	V. Freq.		
Standard	3	5	6	2	4	6	Up	Yes
Thick	5	6	6	2	3	4	Down	No
Special	3	5	6	1	3	4	Down	No
User 1 or 2: Standard, no feed	5	6	6	2	4	6	Up	Yes
User 1 or 2: Standard, double feed	2	4	6	4	5	6	Up	Yes
User 1 or 2: Thick, no feed	5	6	6	1	2	3	Down	No
User 1 or 2: Thick, double feed	3	5	6	3	5	6	Down	No
User 1 or 2: Thick, medium	3	4	5	2	4	6	Down	Yes

2.6.4 PAPER REGISTRATION MECHANSM



Registration Roller Drive

The lower registration roller [A] is driven by a stepper motor [B] (the registration motor).



Paper feed timing must be synchronized with the pressure cylinder rotation, so the registration motor on timing is maintained by the feed start sensor [C].

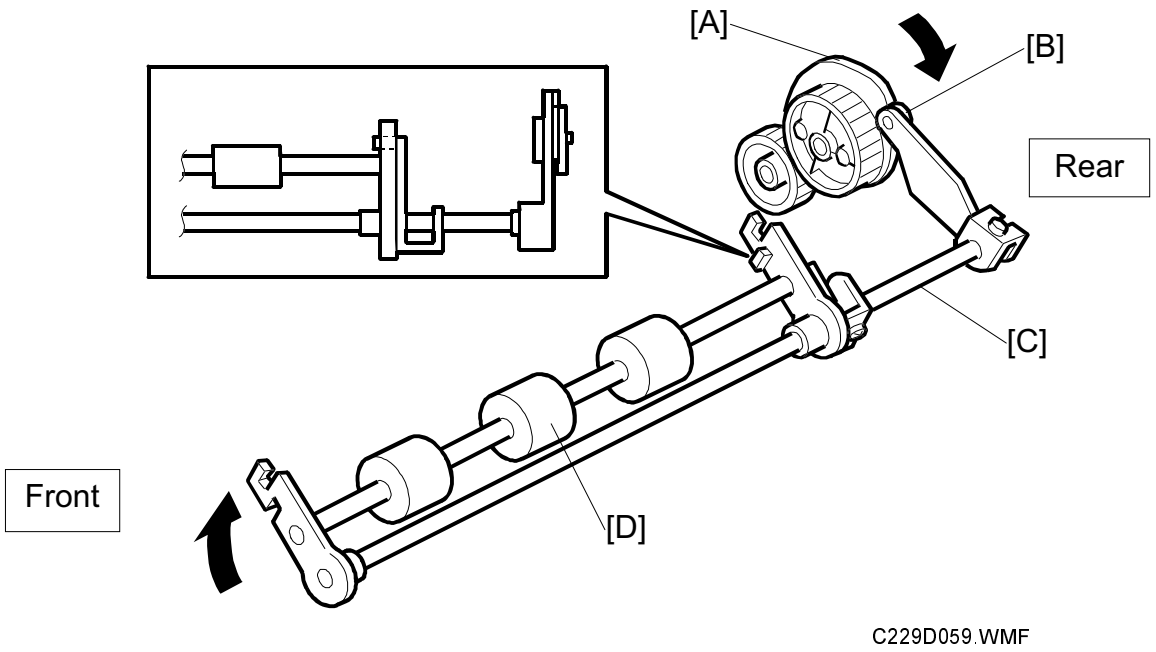
A short time after the pressure cylinder [D] starts rotating, the actuator [A] on the rear of the pressure cylinder activates the sensor. A pre-determined duration later (see Note 1 below), the registration motor starts turning to feed paper to the drum and pressure cylinder. After the printing paper is caught between the drum and the pressure cylinder, the registration motor stops.

NOTE: 1) When the operator selects a higher or lower printing speed (to change the copy image density), the drum and pressure cylinder rotation speed changes. The registration motor must feed the paper at the correct time for the leading edge to be caught by the paper clamper on the pressure cylinder. Therefore, the registration motor start timing after the paper feed start sensor is activated depends on the printing speed selected.
2) There are two actuators: [A] and [B]. The actuator [B] is used to maintain the paper feed motor start timing. (This was mentioned earlier, in ‘Paper Feed Mechanism’.)

Image Up/Down Shift Mode

In addition, the registration motor start timing is changed by pressing the image position keys on the operation panel (this is the image up/down shifting mode). If the paper feed timing is delayed, the image is shifted forward.

NOTE: The leading edge of the paper must be precisely caught by the paper clamper on the pressure cylinder after leaving the registration rollers. When the image up/down shifting mode is used, the position of the pressure cylinder changes through the image up/down mechanism, so the registration motor start timing must change. (The drum stays at home position.) For details of the mechanism, refer to "2.10 Image Up/Down Shifting" section.

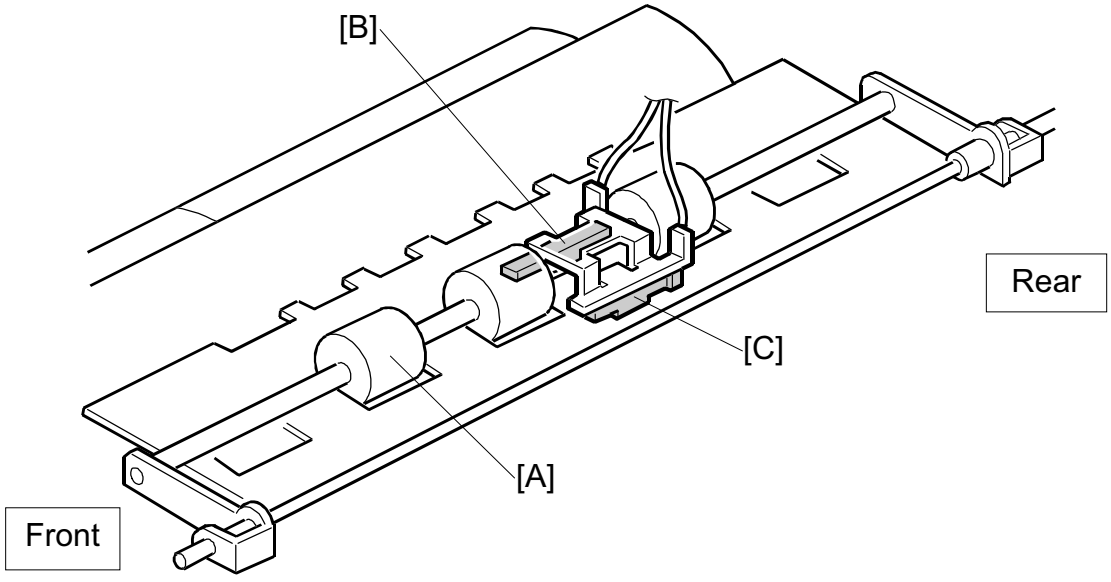


Registration Roller Up/Down Mechanism

After the paper is caught between the drum and the pressure cylinder, the upper registration roller is released from the lower registration roller. This is to prevent interference from the registration rollers while the paper is being fed by the drum and the pressure cylinder.

When the high point of the cam [A] on the drum drive gear reaches the cam follower [B] (a bearing), the shaft [C] rotates clockwise (as seen from the operation side) to release the upper registration roller [D] from the lower registration roller.

2.6.5 PAPER FEED CONTROL MECHANISM



C229D060.WMF

The paper feed timing around the registration roller [A] is monitored by two different photo-sensors. The first is the paper registration sensor [C], which is located before the registration roller. The second sensor is the paper feed timing sensor [B], which is located after the registration roller.

The paper registration sensor [C] detects the paper arriving at the registration roller. The paper feed motor stop timing is determined by this sensor. When the paper comes into contact with the rollers, the paper feed motor remains feeding the paper to create a buckle in the paper to obtain precise paper registration and to prevent paper skew. The paper feed motor stops a pre-determined period after the sensor is activated by the paper. The sensor is also used to detect jams.

The paper feed timing sensor [B] is also used to detect paper jams. It is also used to compensate for delays in paper feed caused by slippage at the registration roller, as described below.

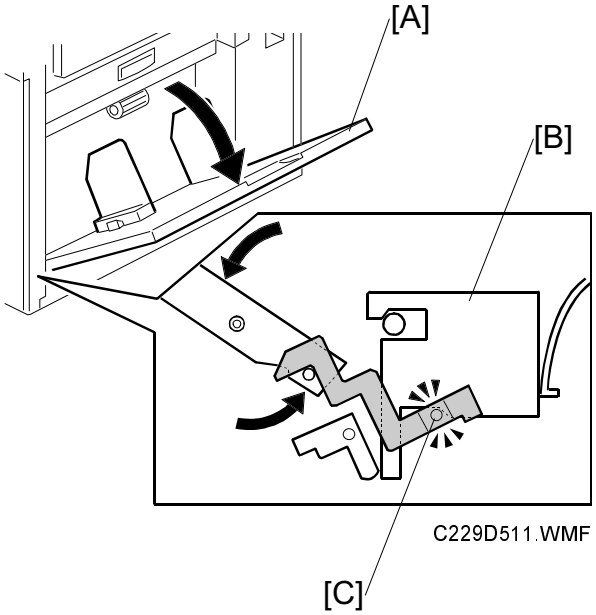
The CPU monitors the paper feed timing sensor after the registration motor starts turning. If the sensor turns on late, the CPU determines that there has been slippage at the registration roller. Depending on the size of the delay, the registration motor speeds up to recover the delay.

2.6.6 PAPER TABLE ANGLE ADJUSTMENT MECHANISM

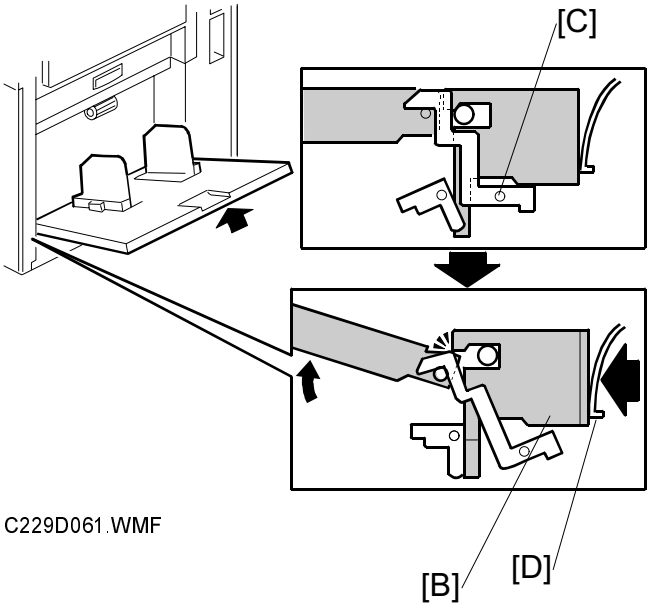
There are two paper table open positions: level, and 15 degrees upward slant. Normally the paper table is set at the level position.

The 15 degrees upward slant position is used to feed special types of paper, such as envelopes, which are difficult to feed at the level position. In the slanted position, the tray capacity is reduced.

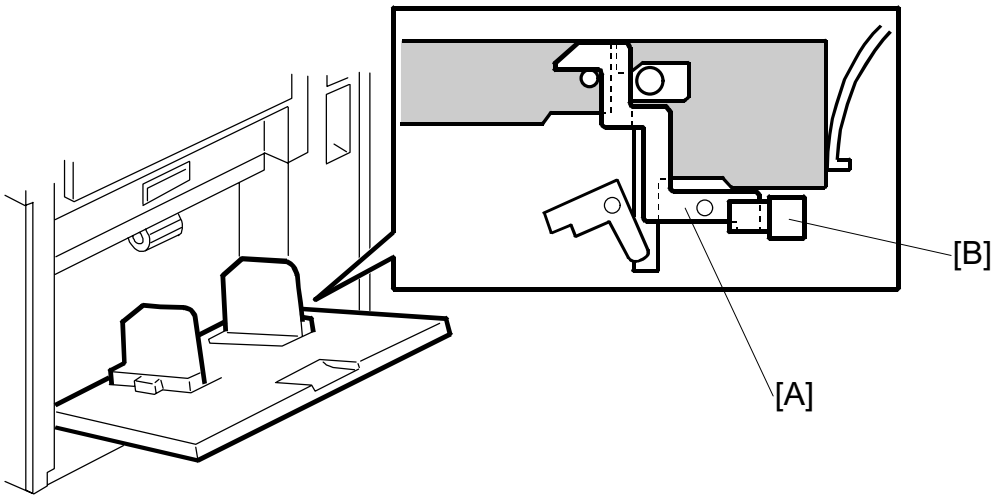
As the paper table [A] is lowered from the closed position, the pin on the lever [C] engages the cutout in the lock bracket [B]. Then, the paper table stops at the level position.



When the paper table is slightly raised from the level position, the spring plate [D] pushes the lock bracket [B], and the pin on the lever [C] disengages. This stops the table at the 15 degrees upward slant position.



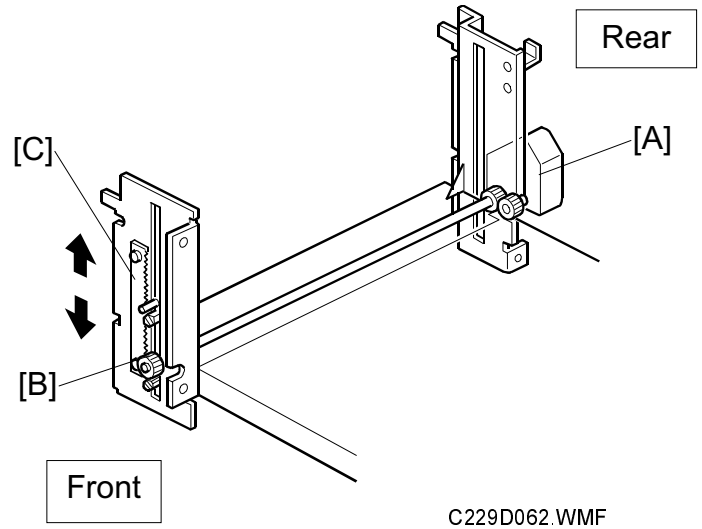
2.6.7 PAPER TABLE OPEN DETECTION



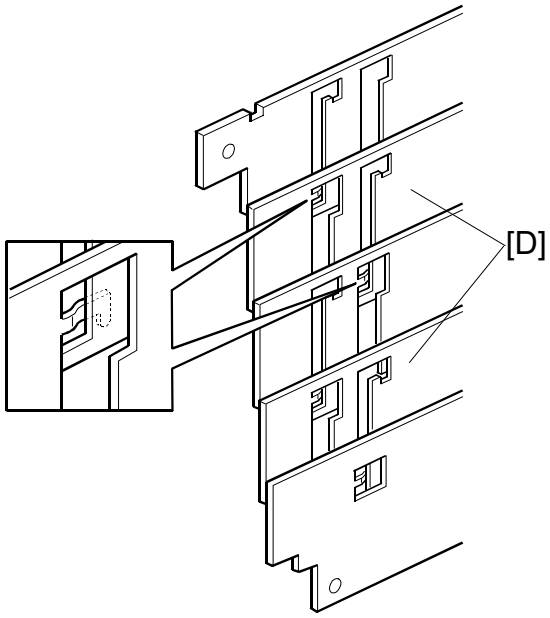
C229D510.WMF

When the paper table is open, the lever [A] activates the paper table set sensor [B]. If the paper table remains closed and the sensor is not activated, guidance will be displayed on the operation panel.

2.6.8 PAPER TABLE UP/DOWN MECHANISM



C229D062.WMF



C229D063.WMF

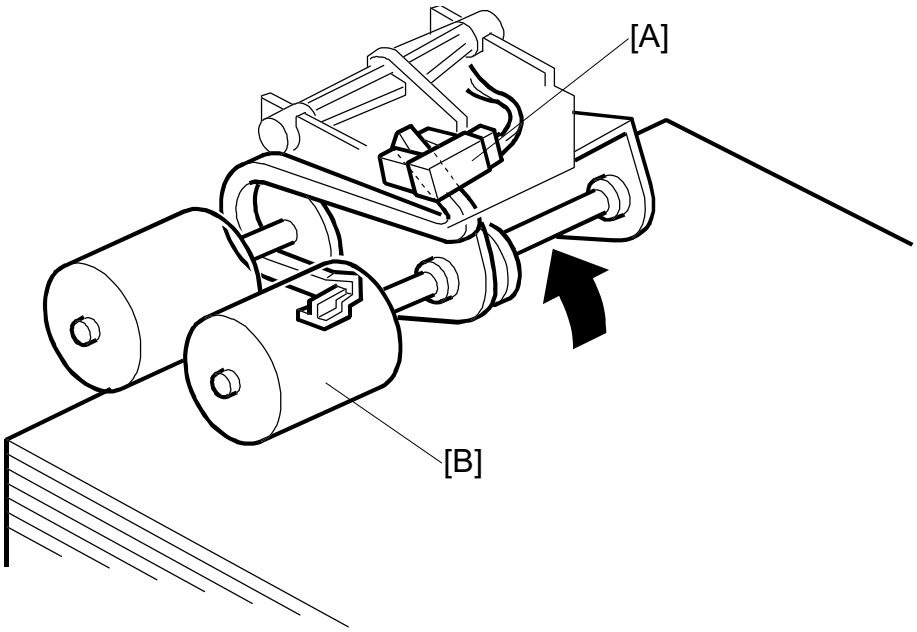
Paper Table Drive Mechanism

An independent dc motor, the paper table motor [A], drives the paper table. When the motor turns, the pinion [B] turns along the rack [C], moving the paper table up or down.

To reduce noise, there is a shutter cover below the table, which is a combination of 5 plates. The shutter closes the opening beneath the paper table when the table is lifted up.

NOTE: Although each plate of the shutter looks similar, only the second and fourth plates [D] from the top are the same in shape. The other plates are all different from each other. Be sure to re-assemble in the correct sequence.

Table Upper/Lower Limit Detection and Paper Height Control



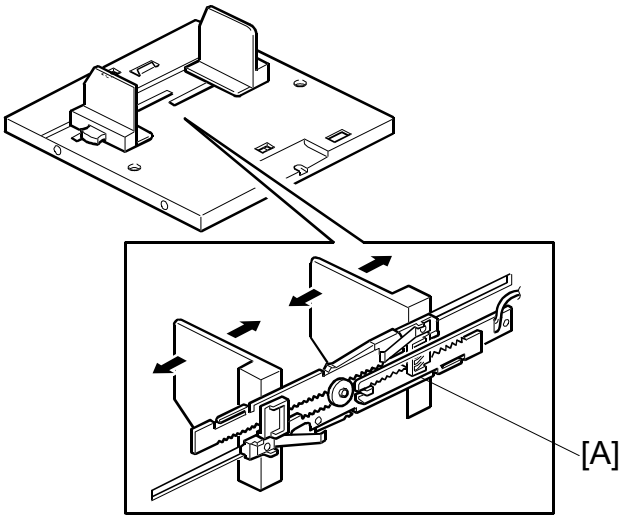
C229D066.WMF

When the paper table moves up, the top of the paper stack contacts the pick-up roller [B], lifting it up. Then, when the paper height sensor [A] is actuated, the paper table stops.

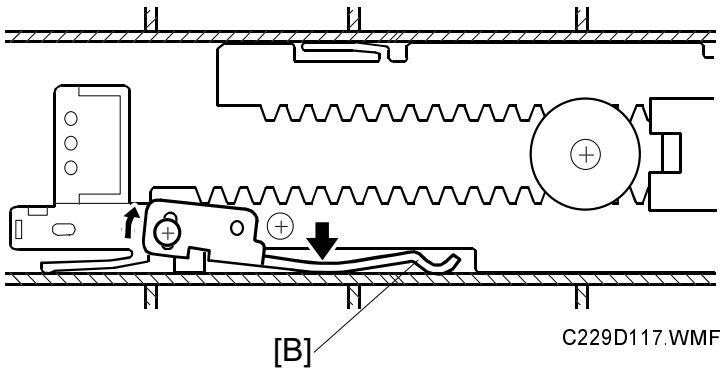
During a printing run, sheets are fed from the stack, and the pick-up roller lowers. When the paper height sensor is de-actuated, the paper table motor starts turning and lifts the paper table until the sensor is actuated again. In this way, the top of the paper stack remains at the same position during printing.

When the tray lowers, the lower limit position is detected by the paper table lower limit sensor (not shown), which is located beside the paper table motor.

2.6.9 PAPER SIDE FENCE MECHANISM



C229D064.WMF



C229D117.WMF

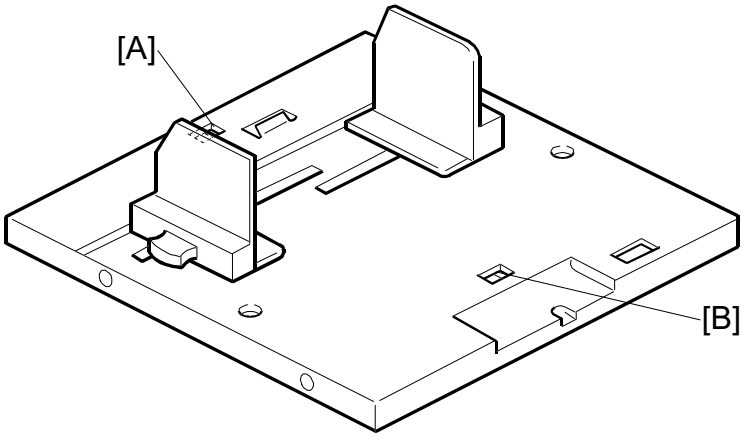
The left and right side fences move together due to a rack and pinion mechanism.

The actuator plate [A] is attached to the rack. This actuates the paper width detection board, to detect the position of the side fences (see Paper Size and Paper End Detection).

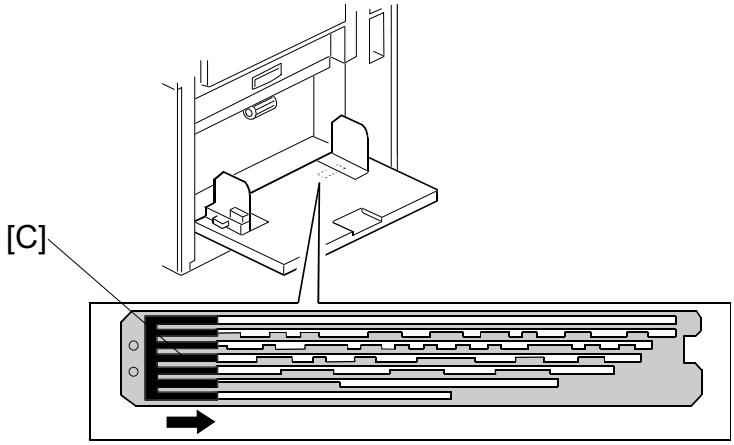
The side plate friction pads on the front and rear paper side fences prevent multiple feed. These are especially useful when thin paper is used.

There are two spring plates [B] applying pressure against the racks (one spring plate each for the right and left racks). Normally, there is no pressure applied to the racks. However, during long copy runs, the side plates may move away from the sides of the stack. By adjusting the position of the spring plates, the side fence pressure can be increased.

2.6.10 PAPER SIZE AND PAPER END DETECTIONS



C229D040.WMF



C229D065.WMF

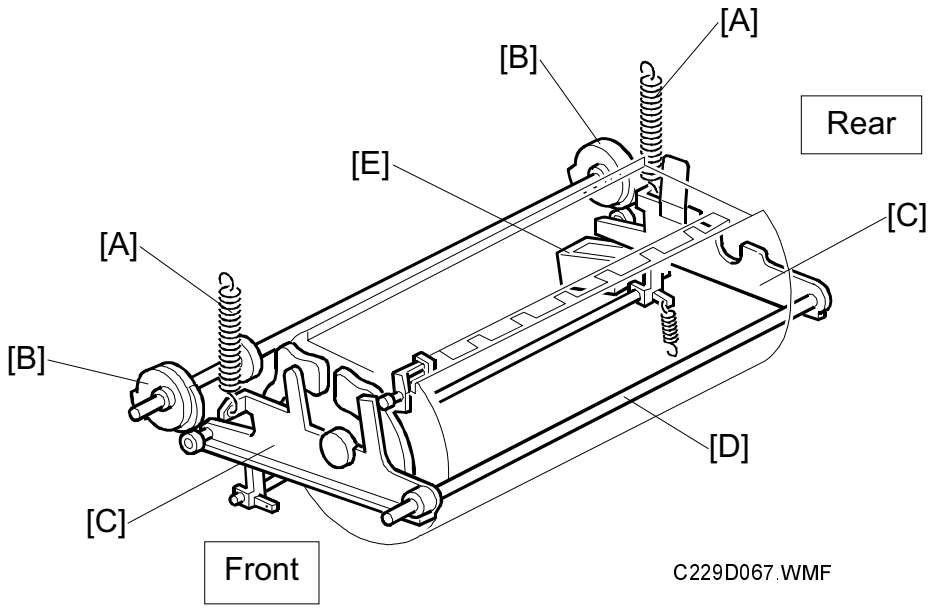
When paper is placed on the paper table, the paper end sensor [A], which is a reflective photosensor, is activated.

If B4 sized (or 8 1/2" x 14") paper or larger is set on the paper table, the paper length sensor [B] is activated.

The actuator plate [C] is attached to the rack for the paper side fences. The paper width detection board detects the position of the side fences. The paper size data is sent to the CPU in combination with the status of the paper length sensor.

2.7 PRINTING AND PRESSURE CYLINDER

2.7.1 OVERVIEW



This model uses a pressure cylinder, instead of a press roller.

Two printing pressure springs [A] (one each at front and rear) pull the pressure cylinder up against the drum through the front and rear printing pressure arms [C]. (The arms rotate around the shaft [D].) Normally, the arms are engaged and the printing pressure is not applied. When the paper reaches the image transfer area, the arms are released by the printing pressure release solenoid [E].

The printing pressure cams [B] control the printing pressure application area to avoid the master clamper on the drum.

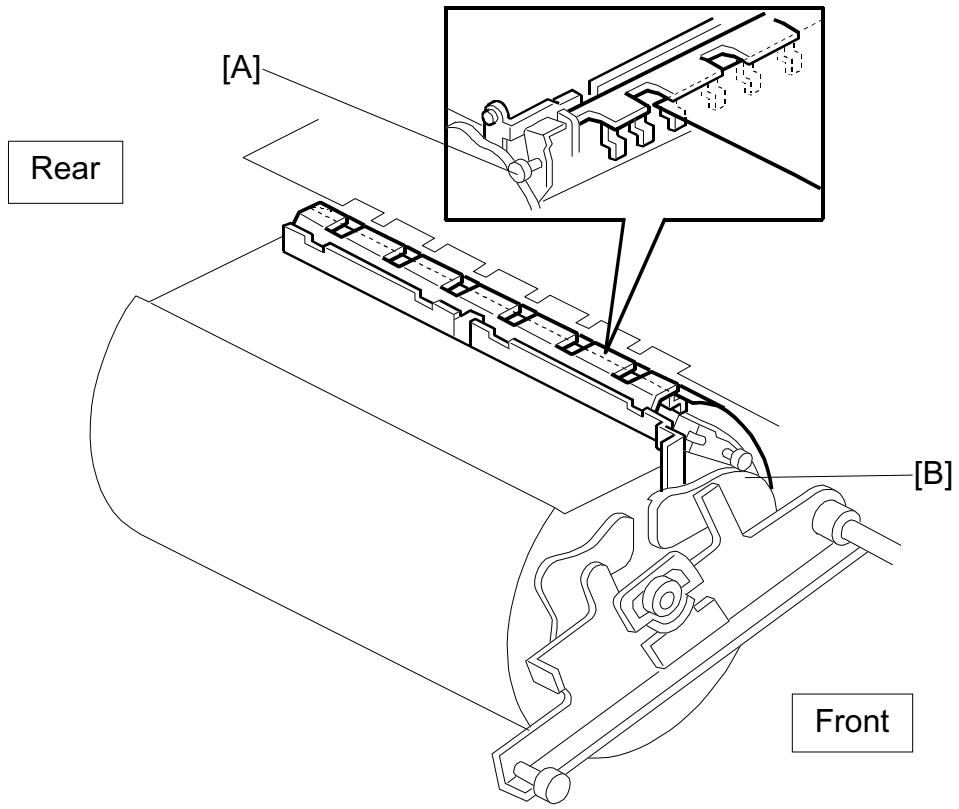
In this model, there are two possible master sizes. Printing on a large master (A3 sized cut) or small master (A4 sideways sized cut) is selected automatically (only if the optional ADF is used). The printing pressure cams include two shapes, one for A3 printing and one for A4 printing, so that the machine can switch to the appropriate printing area.

The paper clamper catches the leading edge of the paper after it has passed the registration roller section.

NOTE: When the Thick Paper mode is selected on the operation panel, the paper is not clamped, because thick paper does not cause paper wrapping jams (around the drum).

If the paper is still wrapped around the pressure cylinder after it has passed the image transfer area, the lower wrapping jam sensor detects it. (The upper wrapping jam, which is paper wrapping around the drum, is detected by the paper exit sensor in the paper delivery unit.)

2.7.2 PAPER CLAMPING



C229D041.WMF

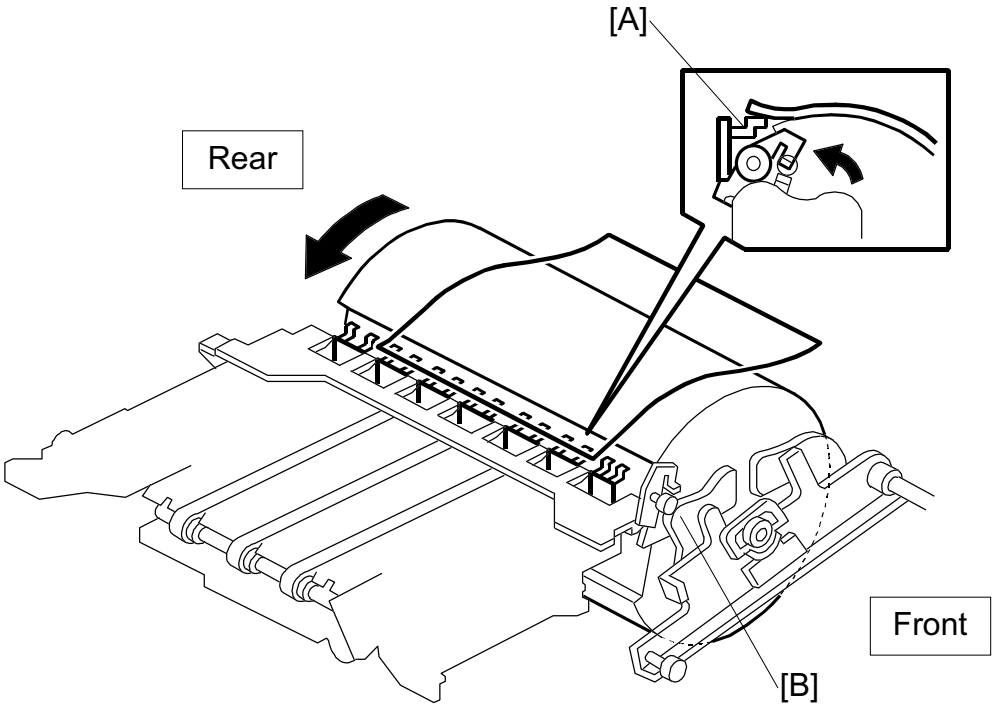
Clamping the Paper

The paper clamper catches the leading edge of the paper after it has passed the registration roller.

As the pressure cylinder rotates, the high point of the cam [B] reaches the bearing [A] on the lever at the front end of the paper clamper, and the clamper opens. When the clamper is open, the leading edge of the paper just reaches the clamper and enters it. After the high point of the cam passes the bearing, the clamper closes and holds the paper using magnets.

When Thick Paper mode is selected on the operation panel, the paper is not clamped. (The clamping is not needed since thick paper does not cause paper wrapping jams around the drum.)

So, for Thick Paper mode, the paper feed start timing at the registration roller is delayed to prevent the paper from being caught by the clamper. Then, the motor speeds up the paper feed to ensure the that the image transfers from the drum at the same timing as for normal paper. The clamper will open and close without clamping the thick paper.



C229D071.WMF

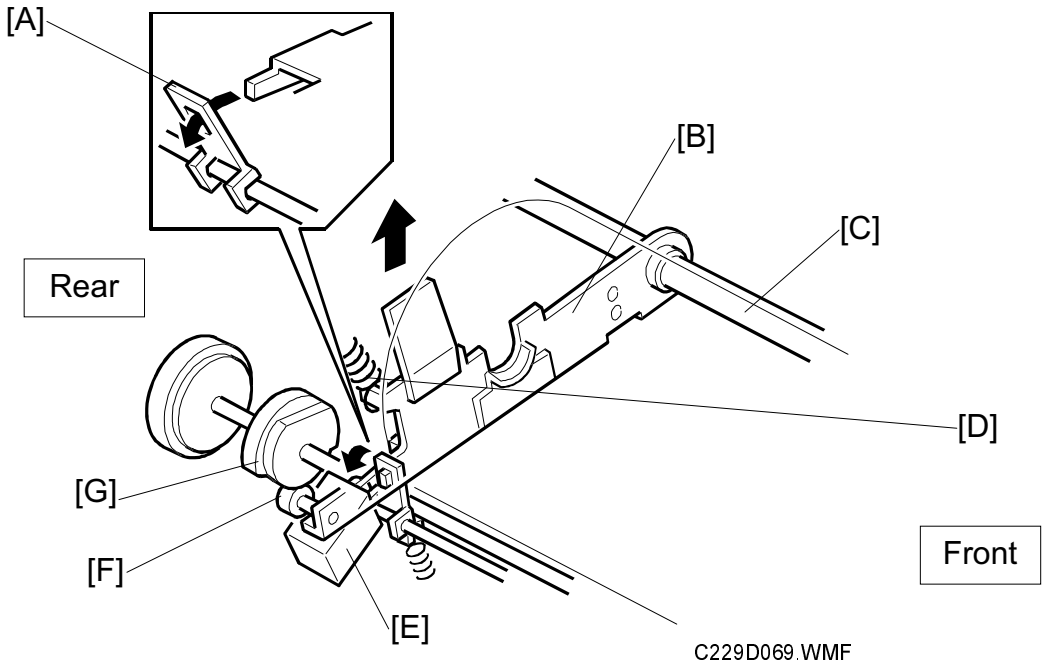
Releasing the Paper

The paper is released shortly after the leading edge passes through the nip between the drum and pressure cylinder where the image is transferred to the paper, and it is fed towards the paper delivery unit.

As the pressure cylinder rotates, the other high point of the cam [B] reaches the bearing at the front end of the clamper. The clamper is again opened and the paper is released.

The opening angle of the clamper for releasing is larger than for clamping, and this causes the paper release pawls [A] to rise to push the clamped edge of the paper, which helps the release mechanism.

2.7.3 PRINTING PRESSURE MECHANISM



There are two printing pressure springs [D] and two printing pressure arms [B], one each at front and rear. The pressure cylinder rests on the printing pressure arms. Normally, the arms are engaged and the printing pressure is not applied.

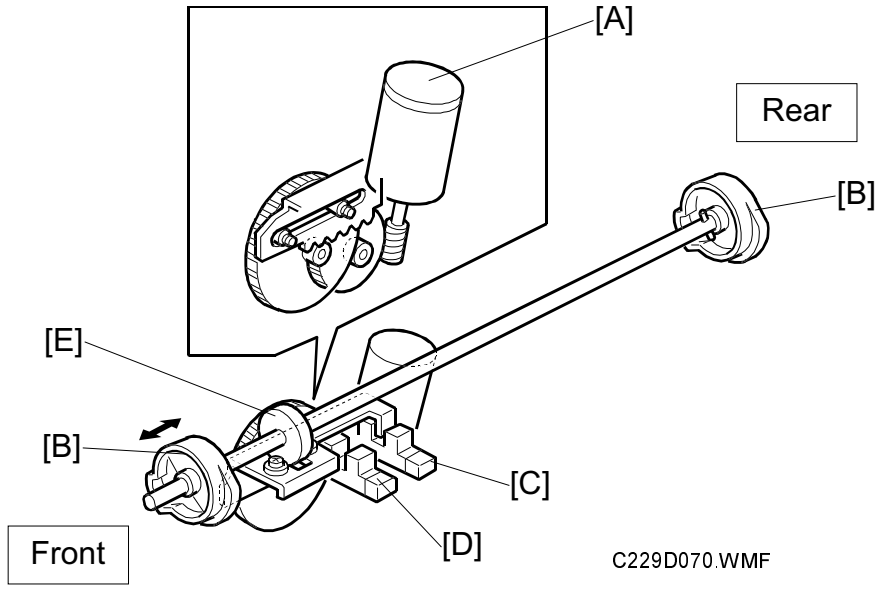
The printing pressure cam [G] always rotates because of drive from the main motor. When the high point of the cam reaches the bearing [F] on the printing pressure arm, it pushes down the arm slightly. At this moment, a small gap is created between the hook on the arm and the printing pressure release lever [A]. Then, the printing pressure release solenoid [E] can release the arms. This occurs when the paper reaches the image transfer area.

When the arms are released, the two printing pressure springs pull the pressure cylinder up against the drum through the front and rear printing pressure arms, which turn around the release arm shaft [C].

The printing pressure cam controls the printing pressure application area to prevent printing pressure from being applied to the master clamper area on the drum. After the printing pressure arms are released, the printing pressure is applied while the bearing on the printing pressure arm is riding on the low point of the cam. When it rides on the high point of the cam, the printing pressure is released to avoid the master clamper.

NOTE: Do not clean the pressure cylinder surface with alcohol or other strong solvents. Use a cloth dampened with water. Periodic cleaning is required for this part.

2.7.4 PRINTING PRESSURE CAM SHIFTING FOR A3/A4 SIZE MASTERS



In this model, printing on a large master (A3 sized cut) or a small master (A4 sideways sized cut) is selected automatically (only if the optional ADF is used).

When the CPU detects that A4 sized paper (or 8 1/2" x 11") or smaller has been set in the sideways feed direction on the paper table, and two or more originals have been placed in the ADF, the machine automatically makes the smaller master.

NOTE: The master sizes are as follows:
Large Master: 320 x 530 mm (320 x 540 mm for U.S.A. models)
Small Master: 320 x 355 mm

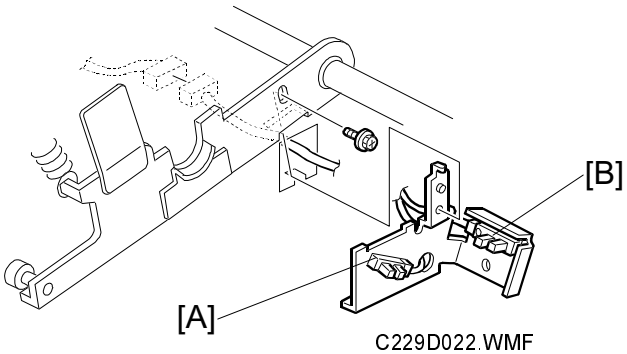
Since the small master does not cover all the printing area of the drum screen, the last original's image is always made on a large master. This is to prevent the drum screen from drying if the next printing job is not done for a long time.

Therefore, a small master is not made when there is only one original in the ADF, even when printing on small paper. (In the Platen mode, the small master is never made because the machine cannot detect the number of originals.)

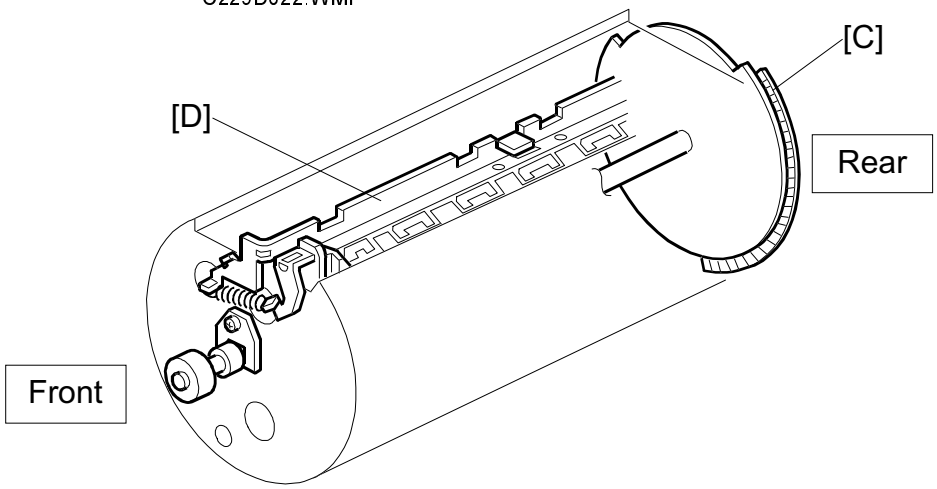
Based on the master size, the correct printing area is applied automatically. The printing pressure cam [B] includes two shapes (for A3 printing and for A4 sideways printing) in one part.

When switching the printing area, the pressure cam shift motor [A] turns. The switching plate [E] moves the cam shaft from side to side through some gears, which moves the printing pressure cam at each end of the shaft from side to side. The rack moves until either the A4 cam sensor [D] or A3 cam sensor [C] is activated.

2.7.5 PAPER FEED CONTROL MECHANISM



C229D022.WMF



C229D068.WMF

Paper Feed Start Timing Detection

There are two actuators on the rear flange of the pressure cylinder. The two actuators activate the paper feed start sensor [A], to determine the start timing of the paper feed motor and the registration motor. (For details, refer to the Paper Feed section – Paper Feed Mechanism, and Paper Registration Mechanism.)

Detection and Feedback of Pressure Cylinder Rotation Fluctuation

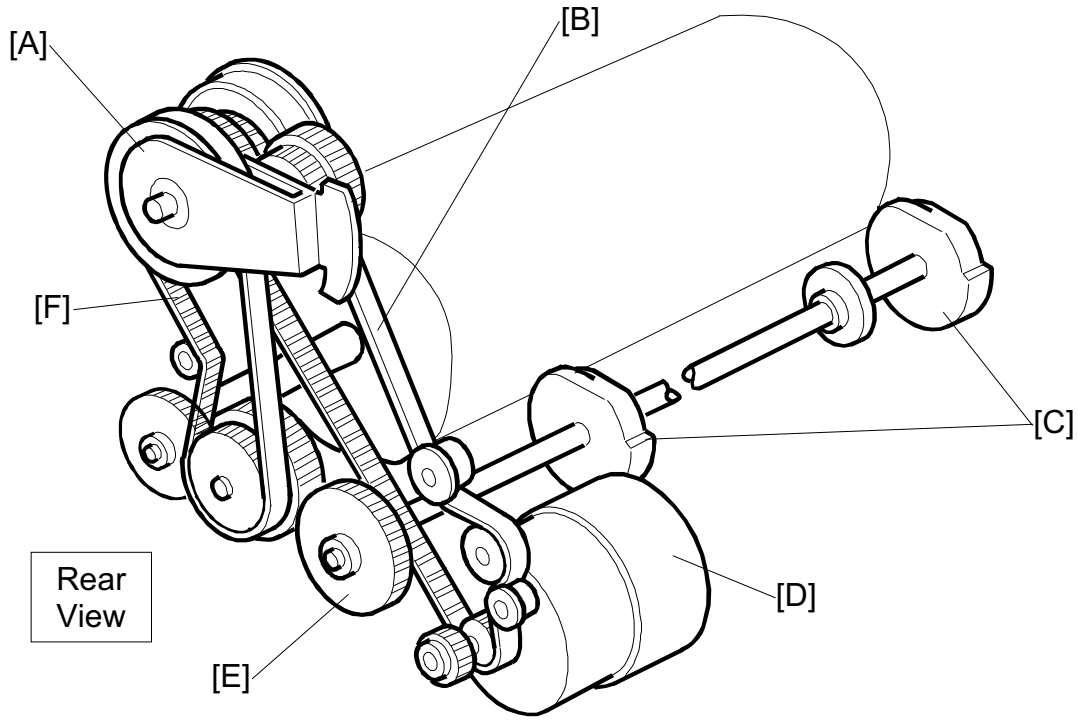
Since the pressure cylinder does not have a perfectly circular cross-section, the rotation speed tends to fluctuate.

The feed encoder [B], which is a photointerrupter, is activated by the encoder plate [C] at the rear of the pressure cylinder, generating a pulse signal. The CPU monitors this signal to detect fluctuations in the pressure cylinder rotation.

Depending on the detected fluctuation, the registration motor start timing is adjusted so that the leading edge of the paper is precisely caught by the paper clamper [D] on the pressure cylinder.

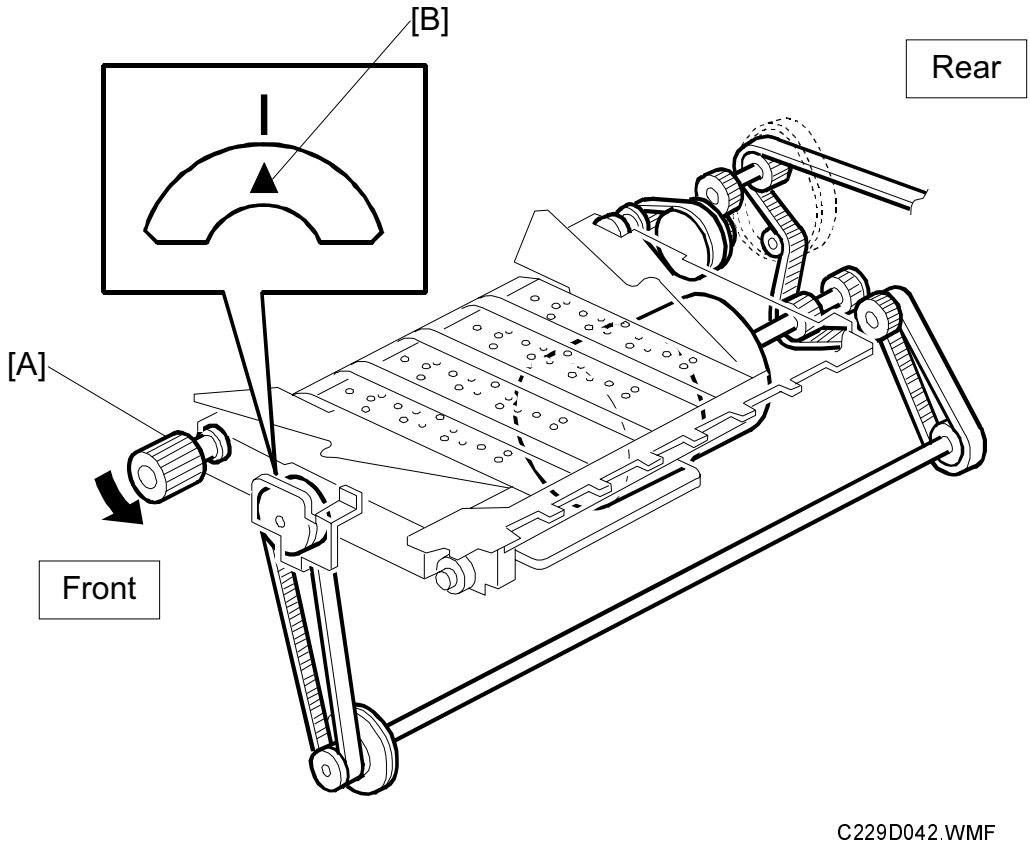
2.7.6 PRESSURE CYLINDER DRIVE MECHANISM

Overview



The main motor [D] rotates the pressure cylinder through the main drive timing belt [B], image up/down shift mechanism [A], timing belt [F], and gears, as shown above. The gear [E] is also driven by the main motor, and it rotates the printing pressure cams [C].

Pressure Cylinder HP Return Mechanism (Manual Pressure Cylinder Rotation)



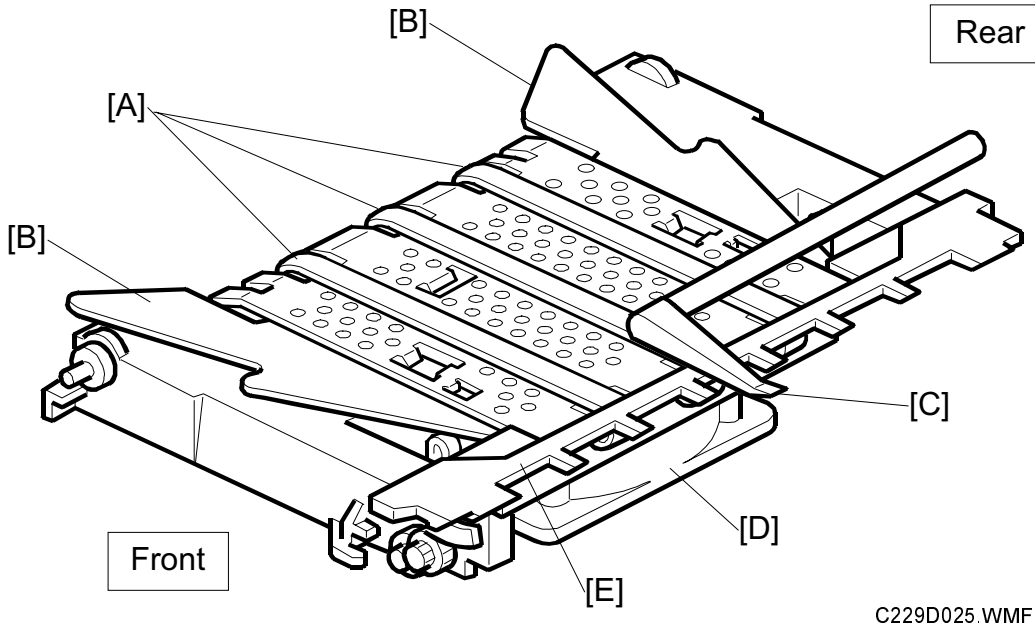
If the operator rotates the pressure cylinder by hand while removing the drum, the main motor drive also turns. It may not be possible to reinstall the drum, because the position of the drum drive gear will have changed.

The knob [A] is used to rotate the main motor drive manually. A small plate covers the knob normally, because it is only for emergency use.

If this happens, the knob can be used to turn the main motor drive. When the arrow [B] on the indicator disk meets the center division, the drive is at home position. The drum drive gear is also at home position, and the drum can be reset.

2.8 PAPER DELIVERY

2.8.1 OVERVIEW



The paper delivery unit consists of three rubber belts [A] and the vacuum fan motor [D]. The rubber belts are driven by the main motor, and they feed the paper, which is held against the belts by suction generated by the vacuum fan motor.

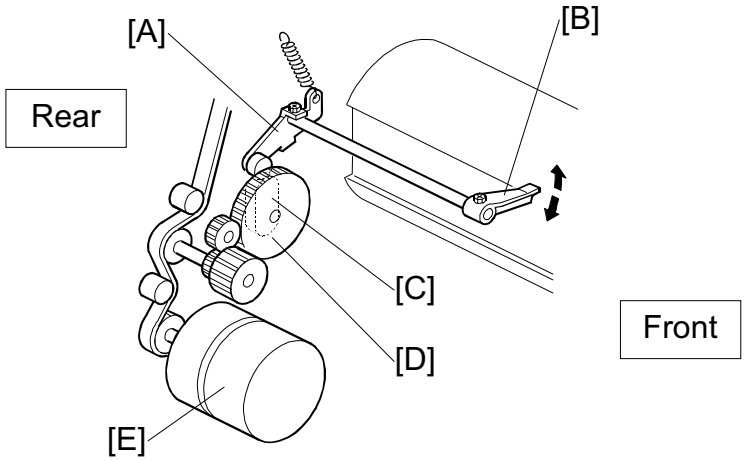
The paper pick-off plate [E] is located close to the pressure cylinder, in order to prevent the paper from being wrapped around the pressure cylinder.

The paper guide wings [B] help to feed out the paper to the delivery table. A dc motor (the wing guide motor) changes the angle of the wings automatically. There are two settings, and the setting used depends on the paper type selected at the operation panel.

The exit sensor (not shown) detects paper misfeeds.

The exit pawl [C] prevents paper from wrapping around the drum. The two air knife fans help to separate the paper from the drum.

2.8.2 PAPER SEPARATION FROM THE DRUM



C229D027.WMF

Exit Pawl Drive Mechanism

The exit pawl [B] guides the center of the paper. This prevents the paper from wrapping around the drum. As the drum rotates and the master clamper approaches the exit pawl, the exit pawl moves away from the drum.

As the main motor [E] turns, the exit pawl drive gear [D] turns. This gear contains a cam [C]. The cam follower on the exit pawl lever [A] rides on the cam. The exit pawl is connected to the exit pawl lever.

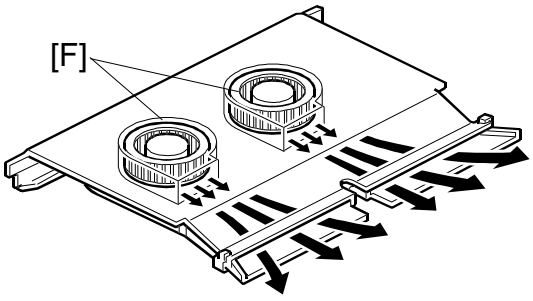
The lever turns clockwise when the cam follower rides on the high point of the cam, and the exit pawl moves away from the drum. This happens when the master clamper on the drum is approaching the exit pawl.

When the master clamper moves away from the exit pawl, the cam follower is now riding along the low point of the cam. Therefore, the exit pawl moves nearer the drum surface due to tension from a spring.

When printing pressure is not applied, the exit pawl is held away from the drum.

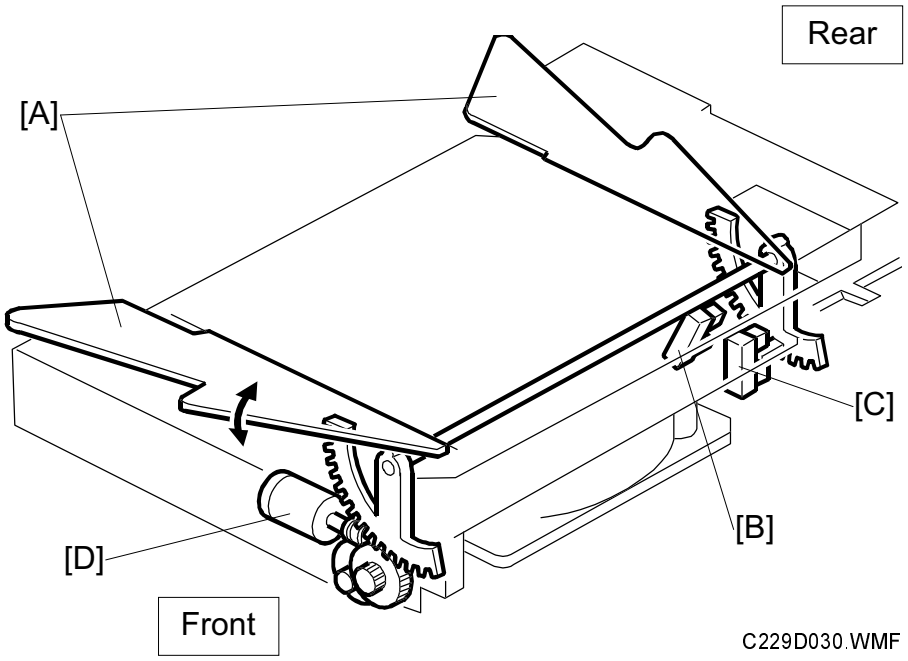
Air Knife Mechanism

There are two air knife fans [F] above the paper delivery unit. These fans blow air against the leading edge of the paper that is just fed from the drum. This helps to separate the paper from the drum.



C229D028.WMF

2.8.3 PAPER DELIVERY WING MECHANISM



The paper guide wings [A] lift the side of the paper as it leaves the delivery unit.

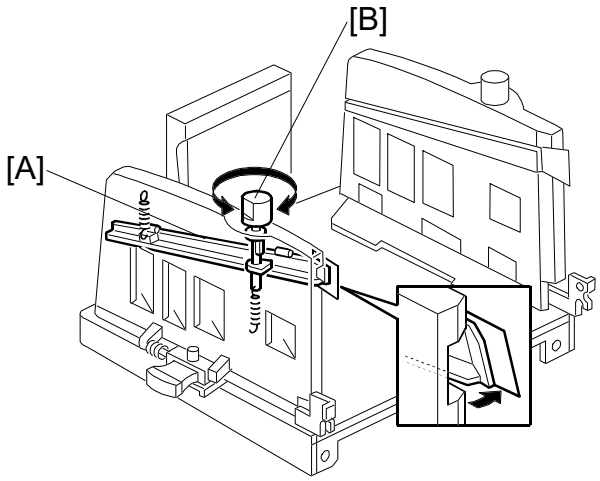
This stiffens the paper so that the leading edge of the paper will not sag and brush against the sheets on the delivery table. This prevents the ink on freshly printed sheets from being smeared.

The angle of the paper wing guides can be changed automatically by the wing guide motor [D], depending on the paper type selected by the operator at the operation panel. When the paper type is changed, the motor automatically changes the angle of the wing guides.

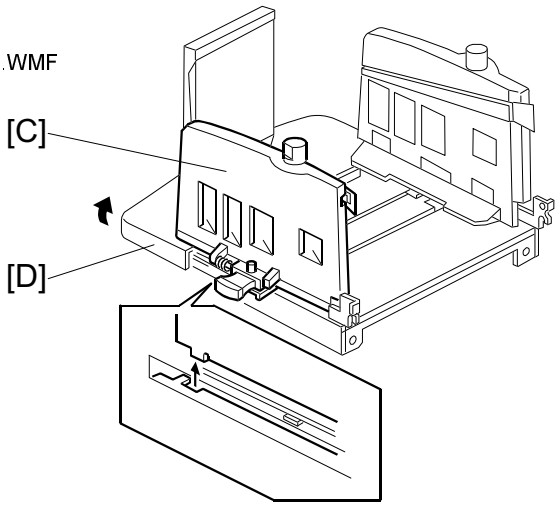
NOTE: The paper types that can be selected are standard, thick, and special. Two additional settings for paper types can be customized as user 1 and user 2. The angle of the paper guide wings for each paper type can be adjusted with SP mode (SP6-100). In addition, the angle can be fixed for all paper types at the upper or lower position with SP2-120, to override the SP6-100 setting. (Refer to the SP mode table in the Service Tables section.)

The wing guide motor [D] moves the paper wing guides up or down through some gears. The wing lower position sensor [C] and wing upper position sensor [B] detect the high and low angle positions of the paper wing guides.

2.8.4 PAPER DELIVERY TABLE MECHANISM



C229D031.WMF



C229D032.WMF

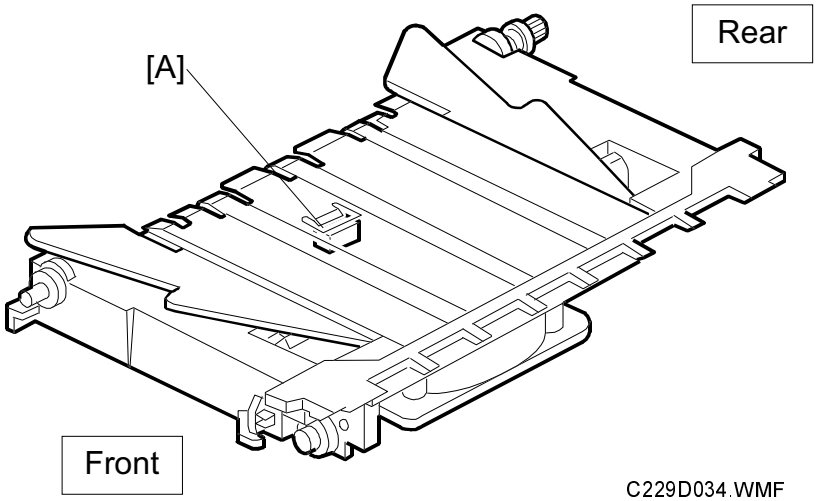
The paper delivery table consists of the rear side fence, front side fence, and end fence. The angle of the small paper guide [A] on each side fence can be changed by turning the knob [B].

The small guides help to stack the paper more evenly on the table. Both edges of the paper are guided by the guides as the copy is fed out. Then, the paper is rapidly fed out against the end plate for stacking.

The front side fence [C] can be laid down towards the operation side, to take out the paper stack more easily.

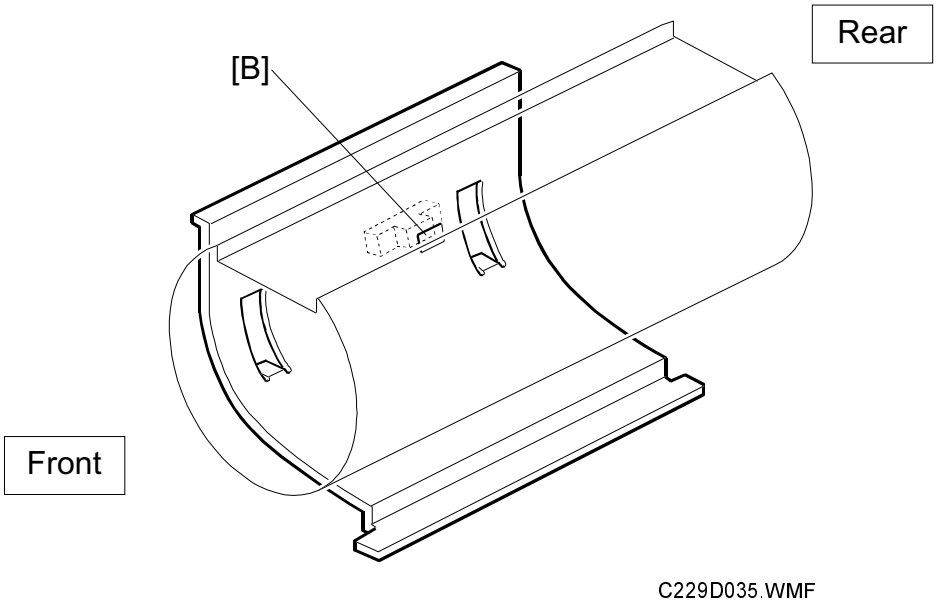
When larger paper than A4 is stacked, the end fence must be slid out to the left. By holding the left end of the table and lifting it up slightly [D], the bottom left of the table can be slid out.

2.8.5 PAPER DELIVERY JAM SENSORS



Paper Delivery Jam

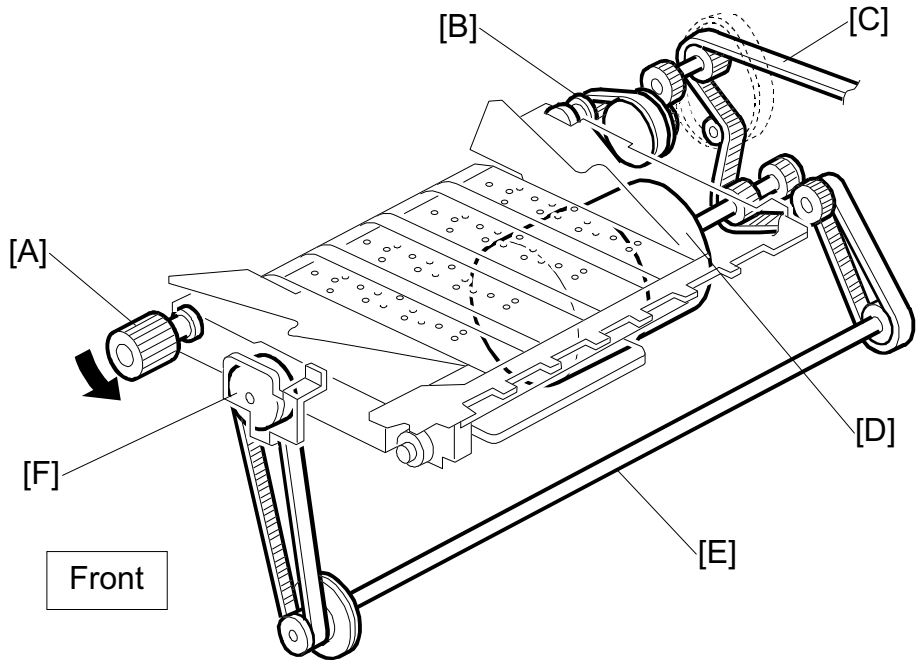
The exit sensor [A] detects paper jams.



Paper Lower Wrapping

The lower wrapping jam sensor [B] detects when paper is wrapped around the pressure cylinder.

2.8.6 PAPER DELIVERY UNIT DRIVE MECHANISM



C229D023.WMF

The paper delivery unit is driven by the main motor. As the main motor [D] turns, the main drive timing belt [C] turns. Drive is transmitted to the pulley [B] at the end of the rubber belt drive roller shaft, through the gears and the timing belt.

The knob [A] can be used to rotate the main motor drive manually. A small plate normally covers the knob, and it is not accessible for the operator. It is for emergency use only.

When the knob is turned by hand, it turns the rubber belt drive roller shaft. The rotation is transmitted to the main drive timing belt [C] via the route opposite to the normal main motor drive.

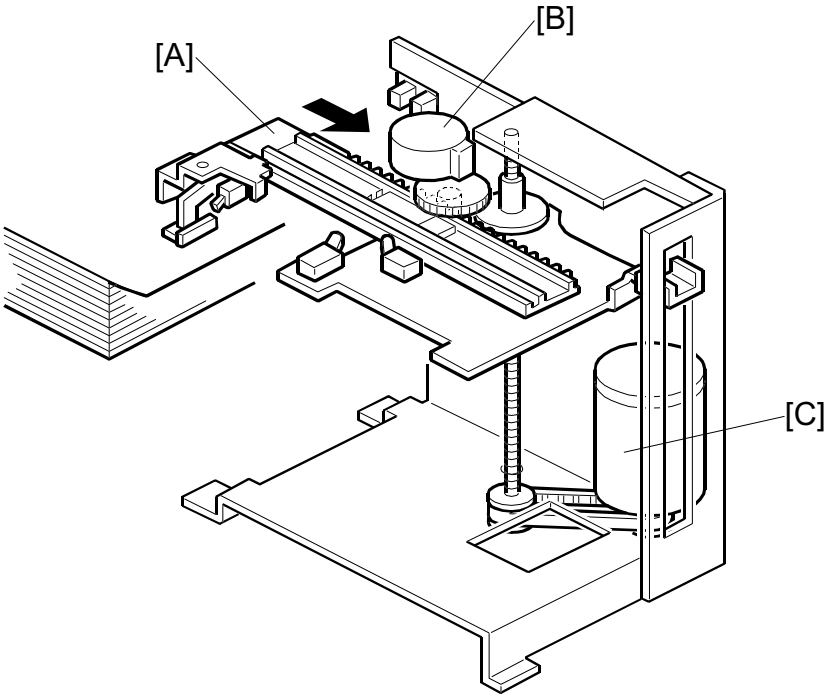
At the same time as the knob is turned, the drive position indicator disk [F] turns through the shaft [E] and two timing belts. The arrow mark on the disk shows the position of the main motor drive.

If the operator rotates the pressure cylinder by hand while removing the drum, the main motor drive also turns. It may not be possible to reinstall the drum, because the position of the drum drive gear will have changed.

If this happens, the knob can be used to turn the main motor drive. When the arrow on the indicator disk meets the center division, the drive is in the home position. The drum drive gear also in the home position, and the drum can be reset.

2.8.7 JOB SEPARATION MECHANISM

Overview



The job separation function can be selected using the Job Separator key on the operation panel. The print on the top of each print set on the paper delivery table is pulled out slightly by the sliding arm [A]. This function is used normally when two or more pages were set in the ADF or when in the Class mode.

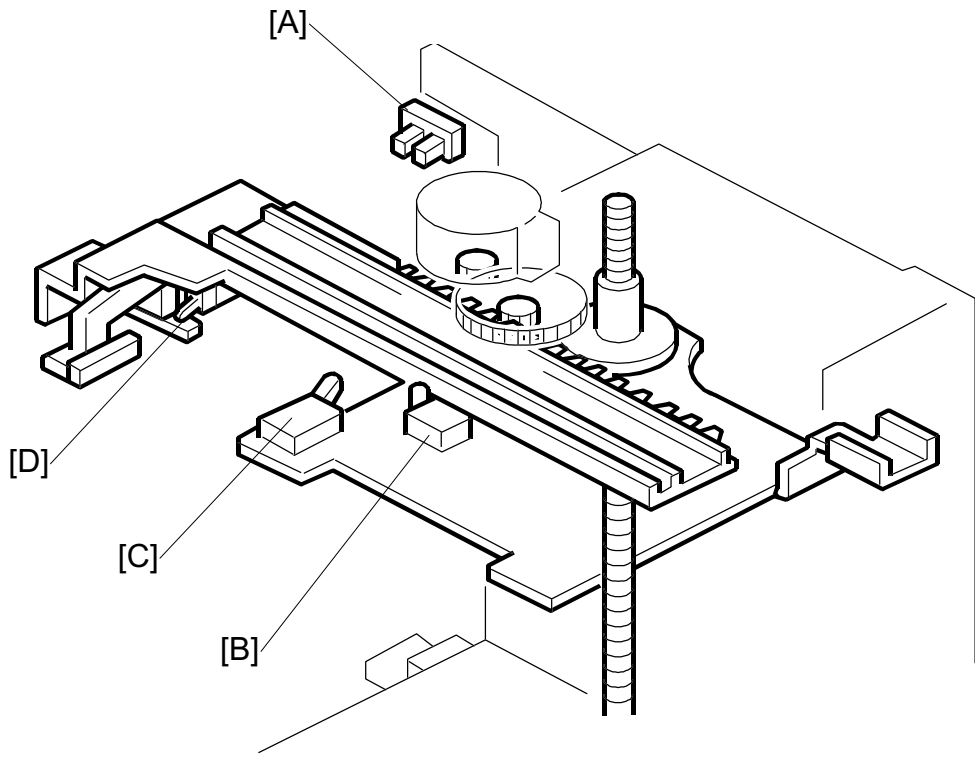
When a job (a set of copies of one original) is completed, the job separator motor [B] turns on to move the sliding arm [A] onto the paper stack on the paper delivery table. Then, the slider lift motor [C] lowers the sliding arm.

A high friction material (a type of sandpaper) is attached to the edge of the sliding arm and it touches the top sheet of the paper stack. Then, the job separator motor turns on again to return the sliding arm. Only the top sheet is moved, and it is moved by about 25 mm.

The sliding arm stays in the same position till the first print of the next job is fed out to the paper delivery table. Then, the job separator and slider lift motors return the sliding arm to the home position.

The slider lift motor can move the sliding arm up and down through a range of approximately 60 mm. This means that the job separation function can work with up to approximately 600 sheets of paper (for 64 g/m^2 paper) on the paper delivery table.

Sliding Arm Control



C229D049.WMF

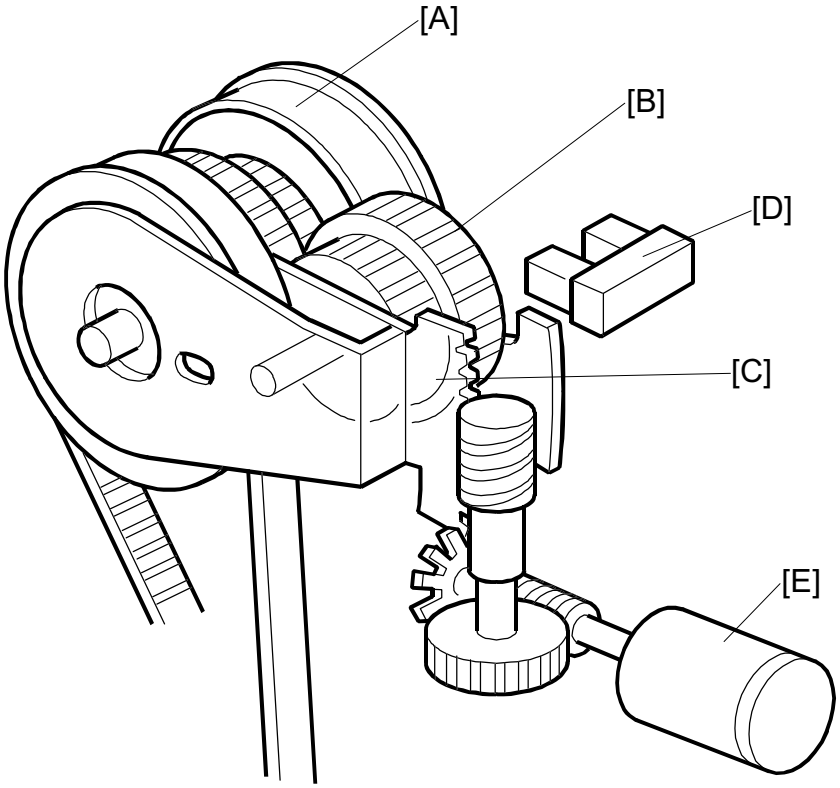
The sliding arm moves across until the slider position sensor [B] (a micro-switch) tuns on. When the sliding arm returns, the job separation motor turns until the slider HP sensor [C] (a micro-switch) turns on.

While the sliding arm is being lowered onto the top sheet of the paper stack, the paper sensor [D] (a micro-switch) turns on when the edge of the sliding arm touches the paper.

The slider upper limit sensor [A] detects when the sliding arm is at its highest possible position.

2.9 IMAGE UP/DOWN SHIFTING

2.9.1 OVERVIEW



C229D036.WMF

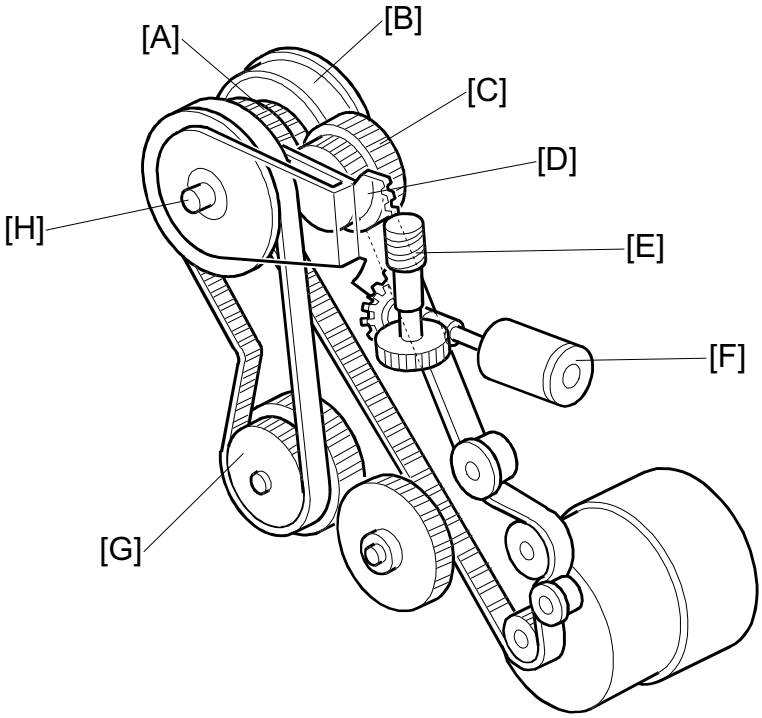
In Image Up/Down Shifting mode, which can be operated at the operation panel, the image position on the print can be moved forward or backward with respect to the paper feed direction.

The image shift amount is controlled by changing the registration motor start timing. However, when the paper feed timing from the registration roller changes, the pressure cylinder position must also be changed so that the paper will be caught properly by the paper clamper on the pressure cylinder. This is also necessary to make sure that the printing pressure application area is correct, since the pressure cylinder cross-section is not completely circular.

The image up/down shifting mechanism changes the position of the pressure cylinder to match the amount of shift selected.

The mechanism is located in the drum drive gear [A]. It is composed of the image shift gear [B], image shift motor [E], image shift HP sensor [D], and image shift arm [C]. The HP sensor is activated when the image shifting arm is at home position.

2.9.2 IMAGE UP/DOWN SHIFTING MECHANISM



C229D037.WMF

This section explains how the machine changes the position of the pressure cylinder to cope with the changed registration start timing in image shifting mode.

The image shift motor [F] turns by an amount that depends on the image shift amount selected at the operation panel. The motor drives the image shift arm [D] through the worm gear [E].

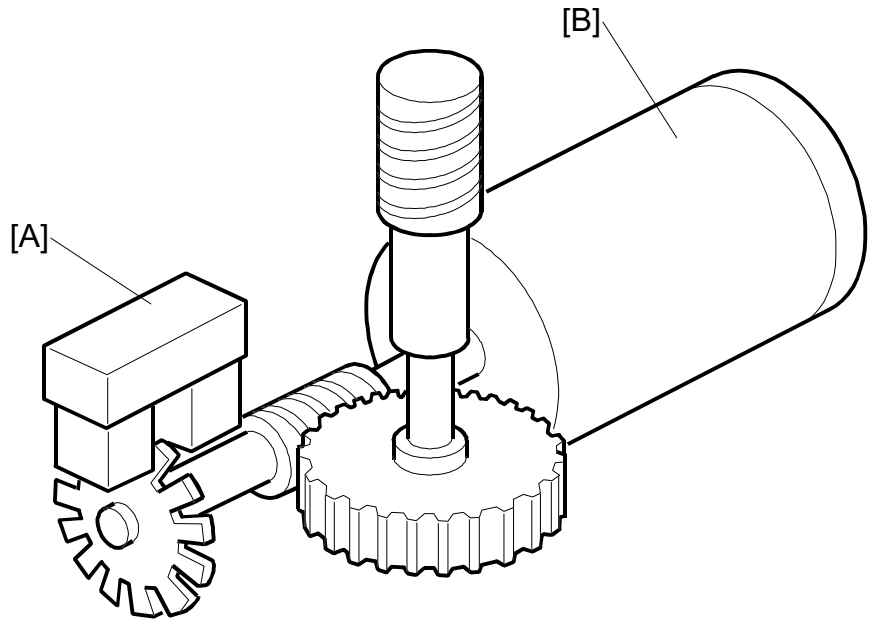
The image shift arm pivots about the shaft [H]. The image shift gear [C], attached to the image shift arm, also rotates about the shaft as it moves around the surface of the primary gear [A]. The image shift gear turns the primary gear as it moves around its surface.

The primary gear is connected to the idler pulley [G] via a timing belt. The idler pulley rotates the pressure cylinder drive gear (not shown). Therefore, moving the image shift gear up or down rotates the pressure cylinder drive gear, which changes the position of the pressure cylinder.

The drum drive gear [B] is also on the shaft [H]. However, it does not turn when the primary gear turns. Therefore, the drum stays in the same position (the home position) even though the position of the pressure cylinder changes.

In this way, a phase difference is made between the positions of the drum and pressure cylinder.

Shifting Amount Detection



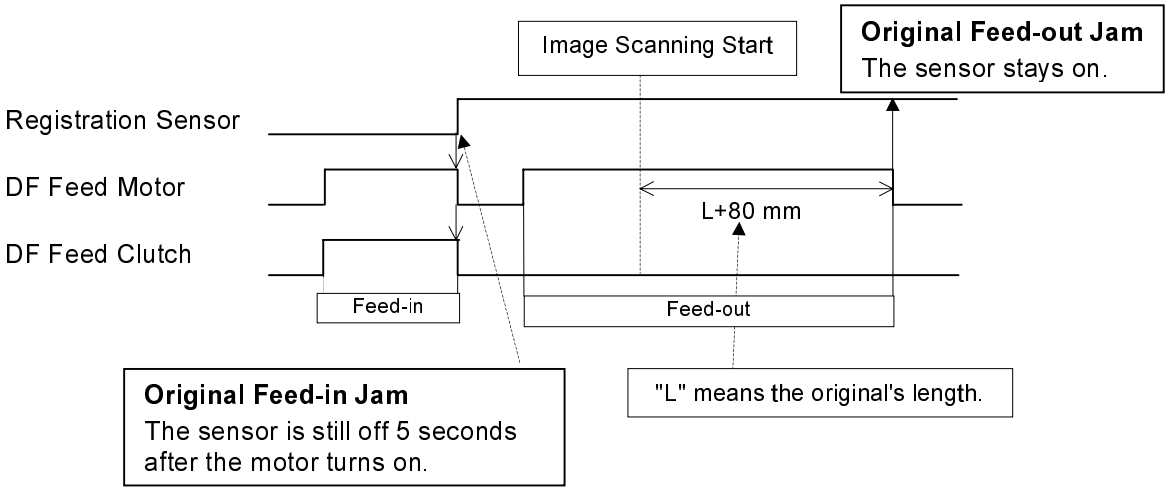
The image shift encoder [A] is activated by the rotation of the pulse disk on the image shift motor [B]. As the motor turns, this encoder generates a pulse signal. The CPU uses this to detect the amount of motor rotation.

The detected amount is displayed on the operation panel as the image shift amount.

When the image shifting mode is canceled, the image shift motor turns until the image shift HP sensor turns on: i.e. the shifting amount is 0.

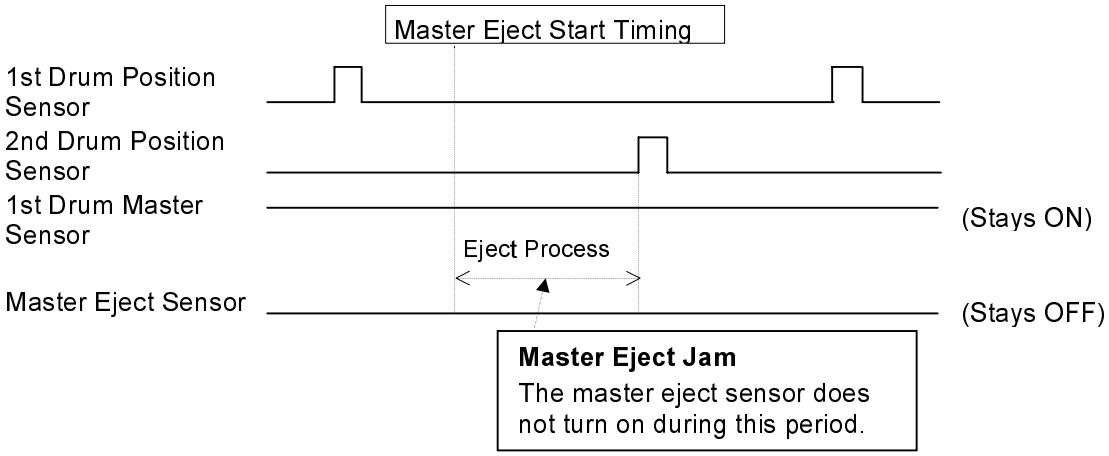
2.10 ERROR DETECTION

2.10.1 ORIGINAL FEED ERROR DETECTION IN THE ADF

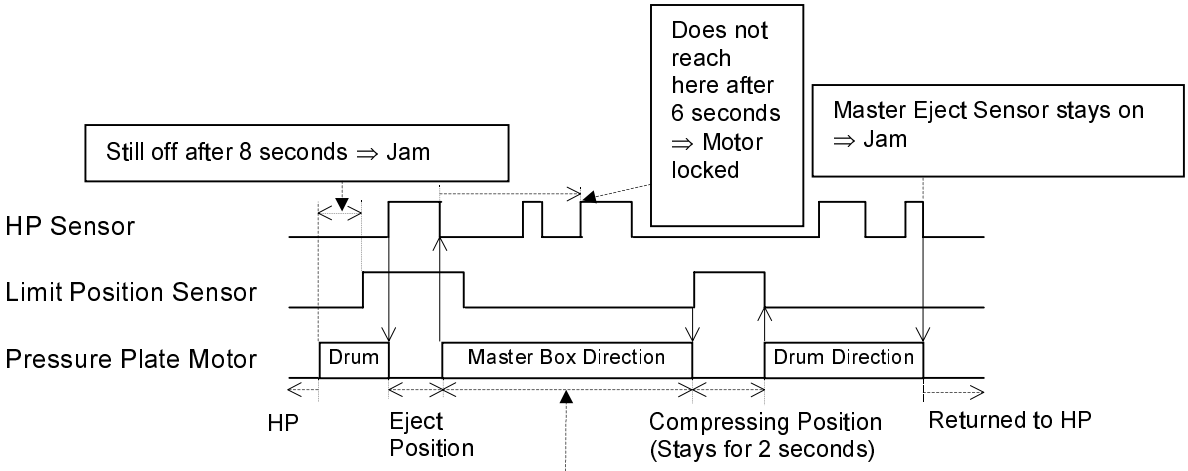


2.10.2 MASTER EJECT ERROR DETECTION

Error of Master Pick-up from Drum



Master Eject and Compression Error



Check during rotation in the master box direction ➔

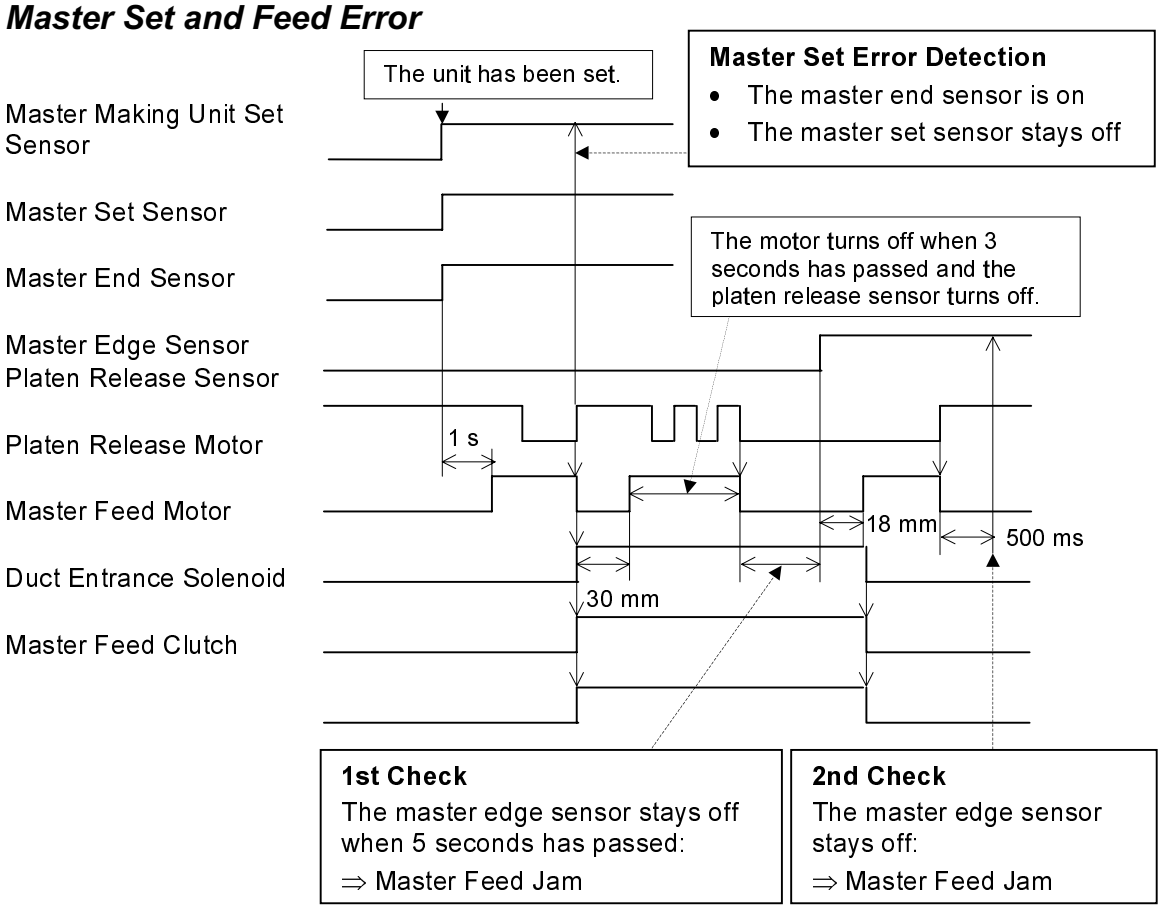
Number of HP Sensor On or Off Edges
(First on edge is just after motor starts.)

- Check Timing -
  When one of the following occurs:
  - When Limit Position Sensor turns on.
  - 6 seconds passes after motor turns on. (4 seconds for the small sized master.)

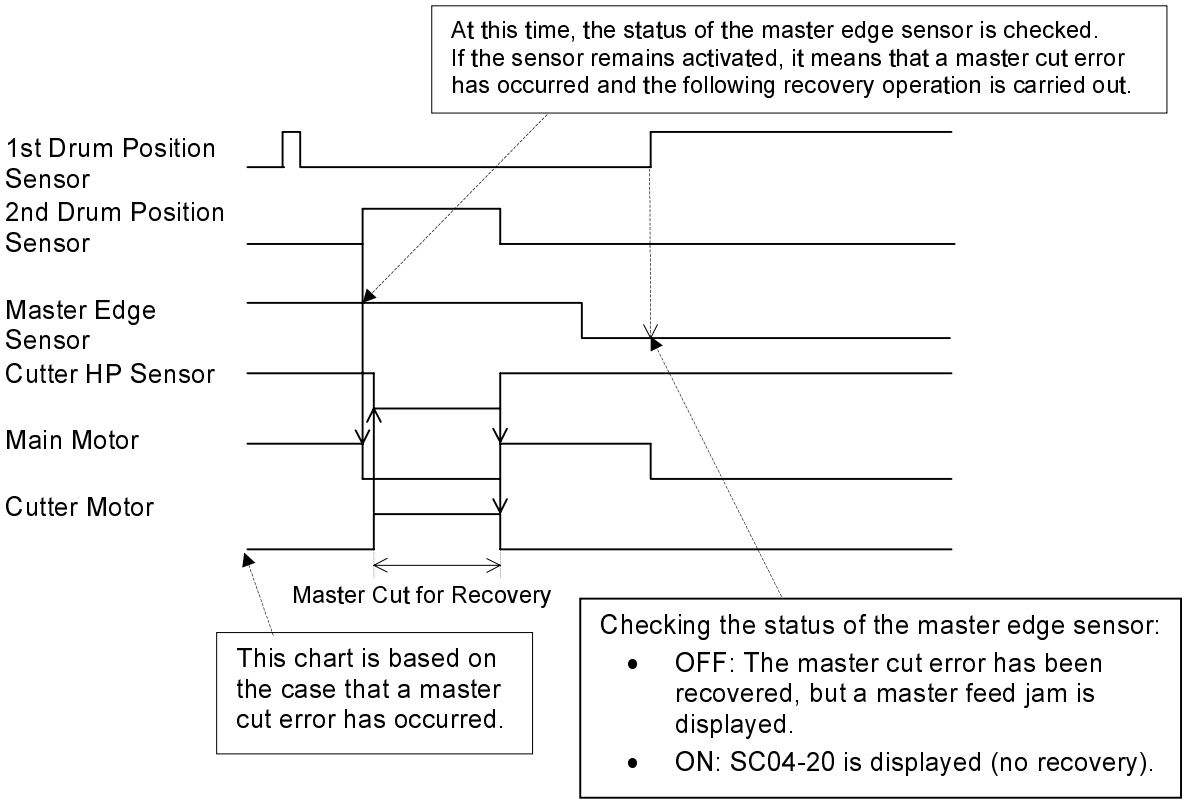
- 5 times ⇒ Normal
- 4 times ⇒ Master box full
- Less than 4 ⇒ Pressure plate locked (SC06-00 lights)

2.10.3 ERROR DETECTION DURING MASTER MAKING

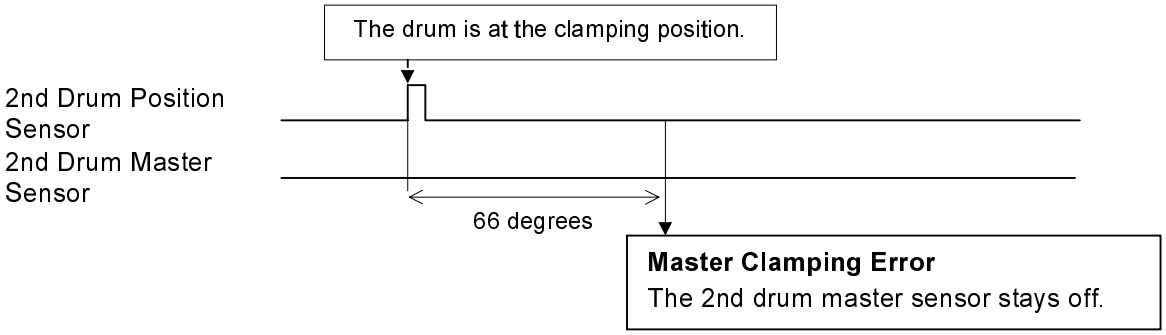
Master Set and Feed Error


The unit has been set.
Master Set Error Detection
• The master end sensor is on
• The master set sensor stays off
Master Making Unit Set Sensor
Master Set Sensor
Master End Sensor
Master Edge Sensor
Platen Release Sensor
Platen Release Motor
Master Feed Motor
Duct Entrance Solenoid
Master Feed Clutch
The motor turns off when 3 seconds has passed and the platen release sensor turns off.
1 s
18 mm
500 ms
30 mm
1st Check
The master edge sensor stays off when 5 seconds has passed:
⇒ Master Feed Jam
2nd Check
The master edge sensor stays off:
⇒ Master Feed Jam

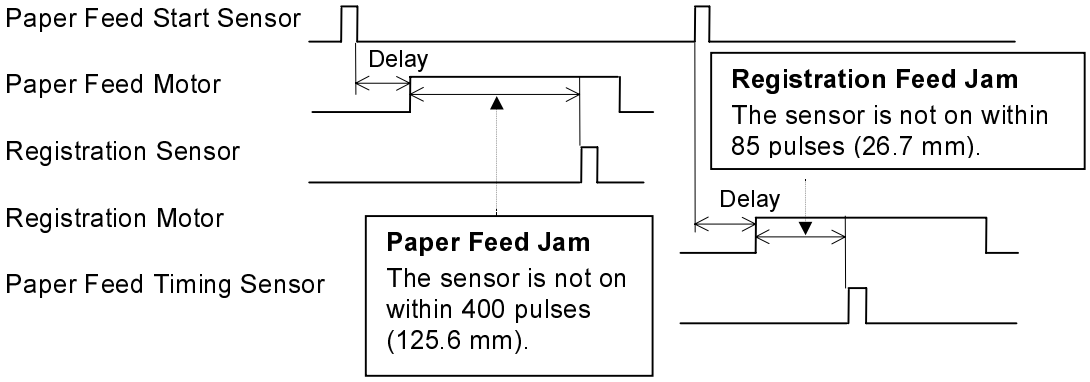
Master Cut Error


At this time, the status of the master edge sensor is checked.
If the sensor remains activated, it means that a master cut error has occurred and the following recovery operation is carried out.
1st Drum Position Sensor
2nd Drum Position Sensor
Master Edge Sensor
Cutter HP Sensor
Main Motor
Cutter Motor
Master Cut for Recovery
This chart is based on the case that a master cut error has occurred.
Checking the status of the master edge sensor:
• OFF: The master cut error has been recovered, but a master feed jam is displayed.
• ON: SC04-20 is displayed (no recovery).

Error During Clamping the Master to the Drum

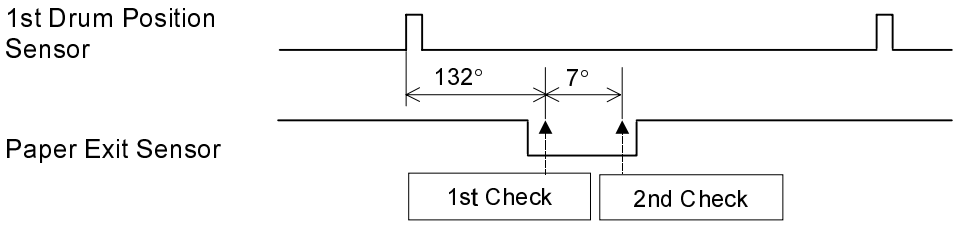

The drum is at the clamping position.
2nd Drum Position Sensor
2nd Drum Master Sensor
66 degrees
Master Clamping Error
The 2nd drum master sensor stays off.

2.10.4 PAPER FEED ERROR DETECTION



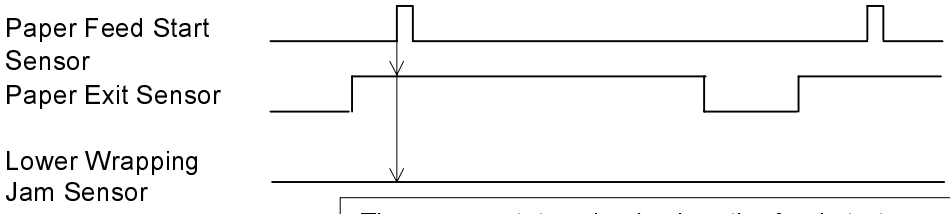
2.10.5 PAPER DELIVERY ERROR DETECTION

Paper Delivery Error



Paper Exit Jam
At both 1st and 2nd checks, the exit sensor is not on.

Paper Upper/Lower Wrapping Detection



The sensor status check when the feed start sensor turns on.

- The paper exit sensor is off, and the lower wrapping jam sensor remains off
  ⇒ Paper jam wrapped around the drum

- Lower wrapping jam sensor is on:
  ⇒ Paper jam wrapped around the pressure cylinder

3. INSTALLATION

3.1 INSTALLATION REQUIREMENTS

The installation location should be carefully chosen because the environmental conditions greatly affect the performance of the machine.

3.1.1 REQUIRED ENVIRONMENTAL CONDITIONS

1. Temperature —10 to 30°C (50 to 86°F)
2. Humidity —20 to 90 % RH
3. Place the machine on a strong and level base. The machine must be level within 5 mm both front to rear and left to right.

3.1.2 ENVIRONMENTS TO AVOID

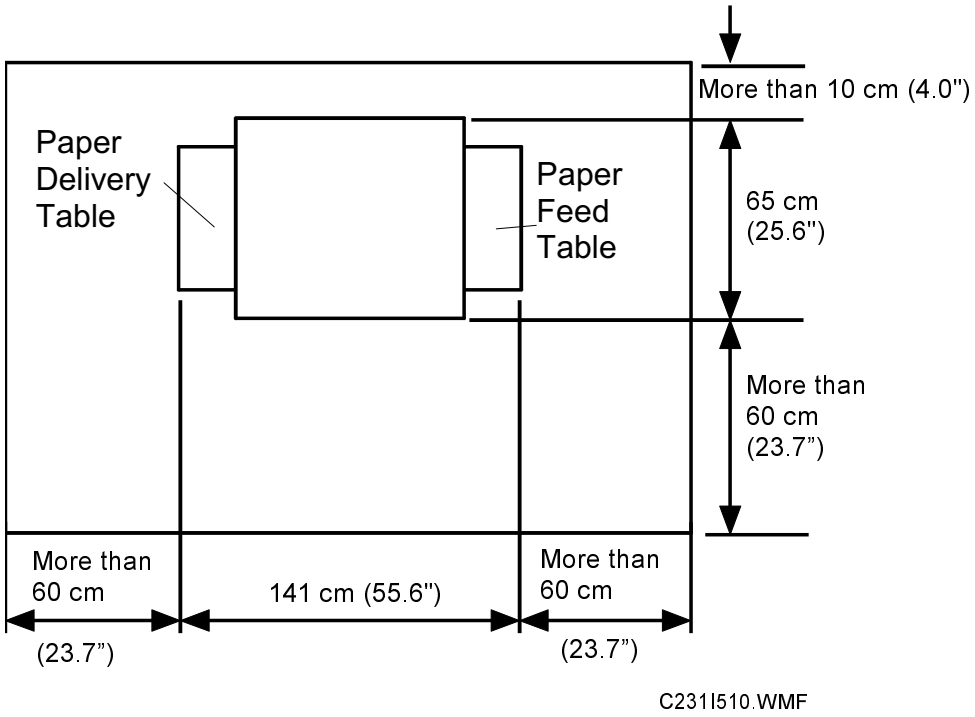
1. Locations exposed to direct sunlight or strong light (more than 1,500 lux).
2. Areas with corrosive gases.
3. Dusty areas.
4. Locations directly exposed to cool air from an air conditioner or reflected heat from a space heater. (Sudden temperature changes from low to high or vice versa may cause condensation within the machine.)

3.1.3 POWER CONNECTION

1. Securely connect the power cord to a power source.
2. Make sure that the wall outlet is near the machine and easily accessible.
3. Make sure the plug is firmly inserted in the outlet.
4. Avoid multiwiring.
5. Voltage must not fluctuate more than 10%.
6. Do not pinch the power cord.

3.1.4 ACCESS TO MACHINE:

Place the machine near a power source, providing clearance, as shown below.



3.2 INSTALLATION PROCEDURE

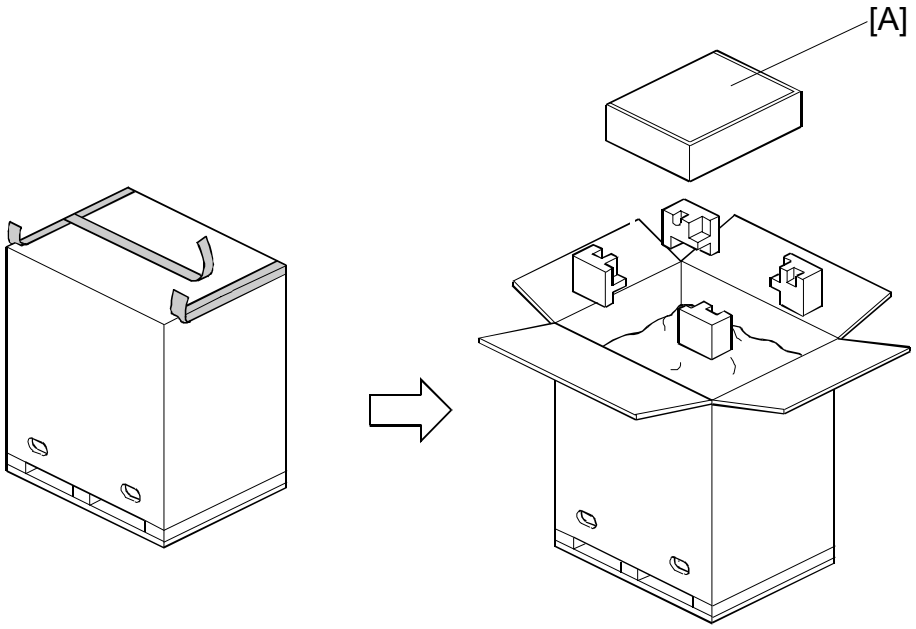
3.2.1 MAIN BODY

Accessory Check

Make sure that you have all the accessories listed below.

Operating Instructions (Expect for Ricoh European Version)..... 1
NECR (Ricoh version only)..... 1
Brand Stickers
(OEM version only)..... 1 set
Model Name Plates
(OEM version only)..... 1 set
Paper Delivery Table..... 1 set

Installation Procedure



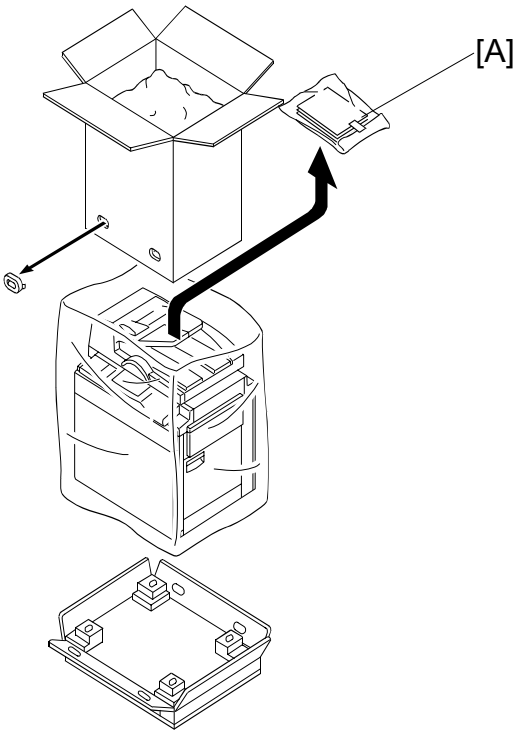
C229I003.WMF

⚠CAUTION

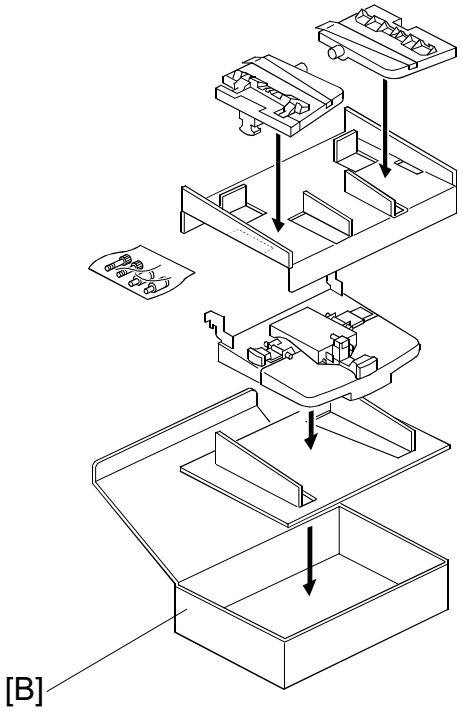
Unplug the main power cord before starting the following procedure.
Open the box from the top. If opened from the bottom, the paper delivery table may be damaged.

1. Unpack the box. Take out the small box [A] inside that contains the paper delivery table.

   CAUTION: First, open the upper opening of the box, and remove the small box inside [A]. This prevents the paper delivery table (inside the box [A]) from being damaged.

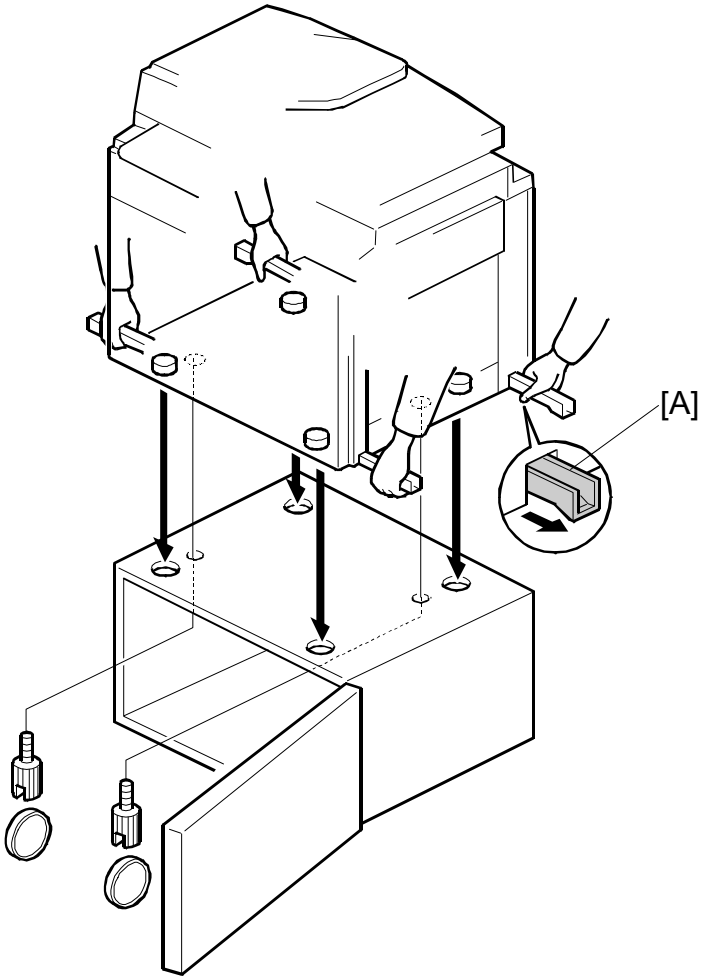


C229I002.WMF



C229I010.WMF

2. Continue to unpack the box. Make sure that there are the accessory bag [A] and the paper delivery unit inside the small box [B].

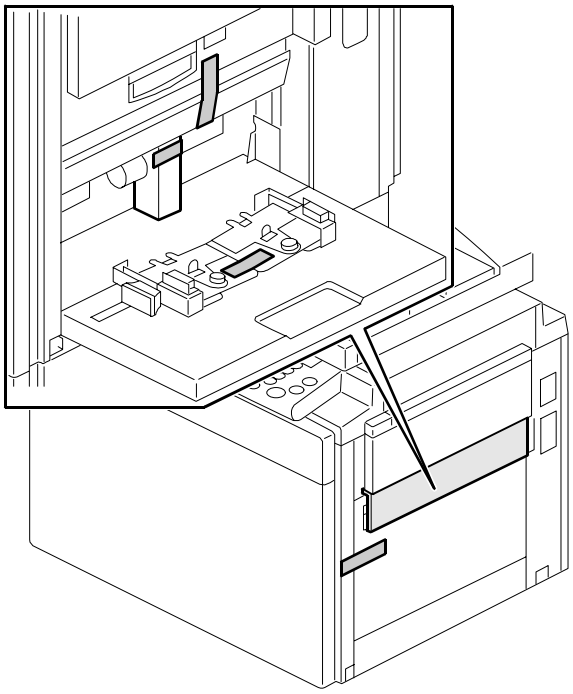


C229I006.WMF

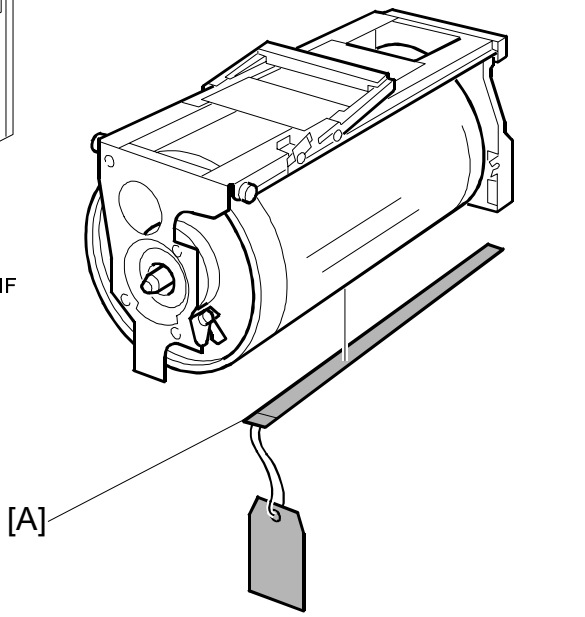
3. When installing the optional table, mount the machine, as shown. (2 screws packed with the table).

⚠CAUTION

Only handle using the carrying handles [A] on the bottom of the machine. Otherwise, your fingers may be pinched between the main body and the table during installation. (The gap between the bottom of the main body and the table is very small.)

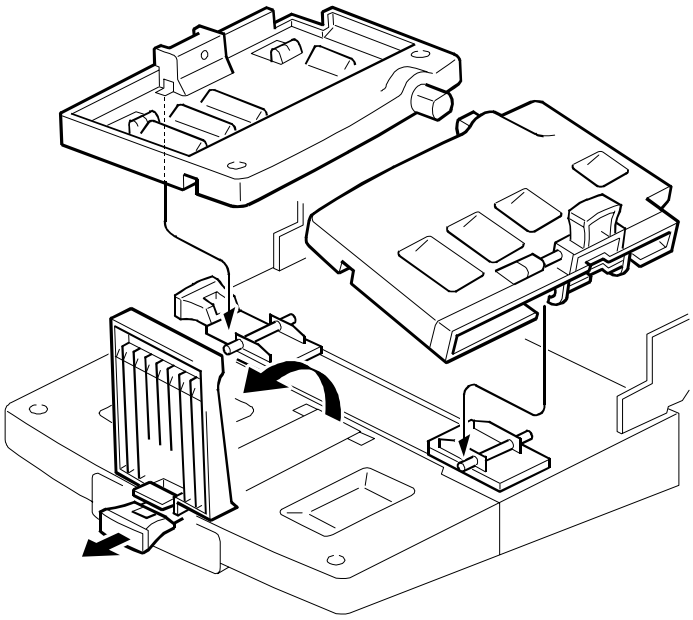


C229I004.WMF



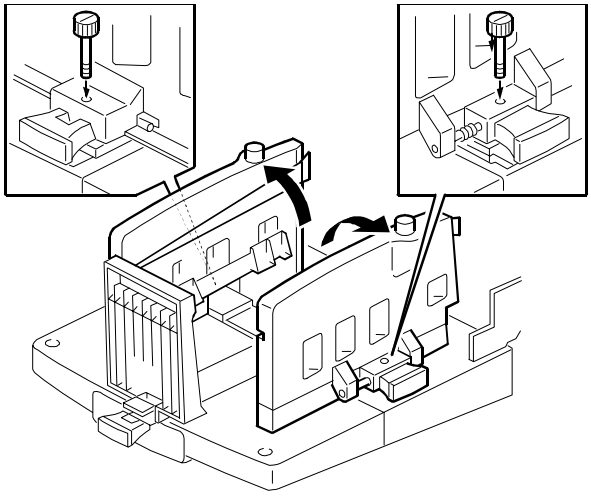
C229I011.WMF

4. Remove the tape securing the covers and units, and the master clamper protective sheet [A], as shown.



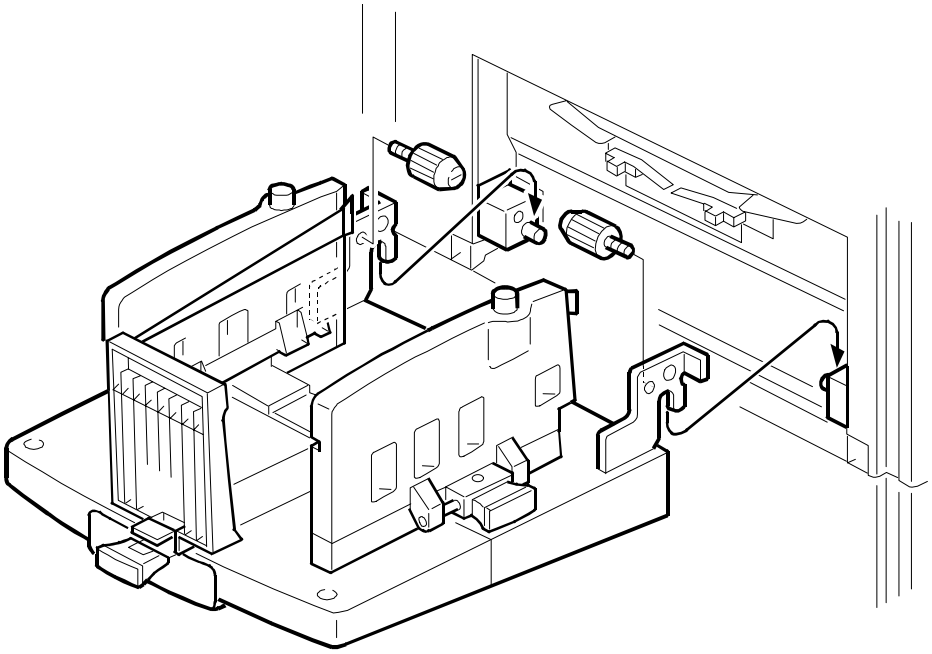
C229I008.WMF

5. Take out the paper delivery table from the box.
6. Set the front and rear side fences, as shown.



C229I009.WMF

7. Assemble the paper delivery table, as shown (two screws).



C229I007.WMF

8. Install the paper delivery table (2 screws).
9. Install the master roll.
10. Install the ink cartridge.
11. Firmly insert the plug in the wall outlet.

CAUTION: Make sure that the wall outlet is near the machine and easily accessible.

12. Turn on the main switch.
13. Press the “Economy Mode” key while holding down the “0” key, to supply ink to the drum.
14. Make test copies.

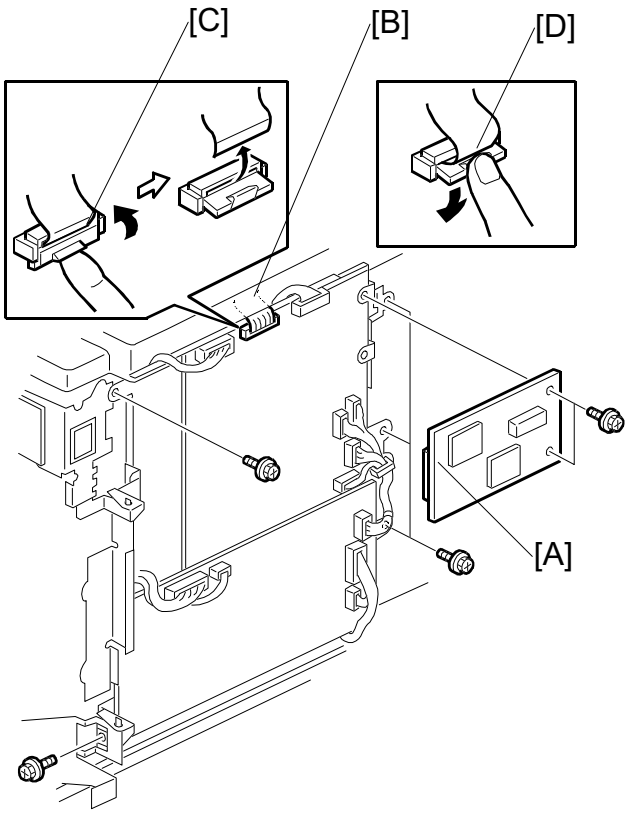
3.2.2 AUTO DOCUMENT FEEDER (OPTION)

Accessory Check

Make sure that you have all the accessories listed below.

- Document feeder unit 1
- DF harness 1
- Screws 2
- Thumb screws 4
- Stabilizer brackets 2
- DF scale cover 1
- DF exposure glass 1
- Caution label 1

Installation Procedure



⚠CAUTION
Unplug the main body power cord before starting the following procedure.

Moving the MPU aside

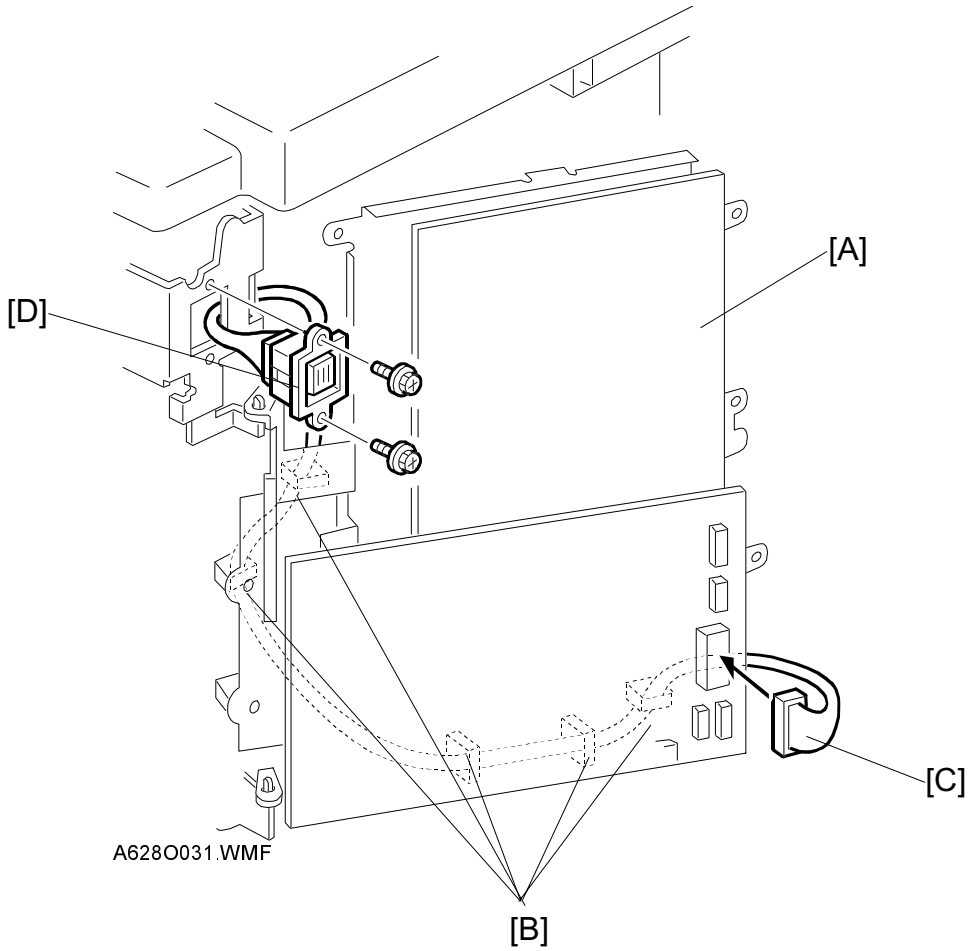
1. First, remove the rear exterior cover of the main body.

   A: Remove the memory board [A] (If installed as this is an option).

   B: Disconnect the flat cable [B].

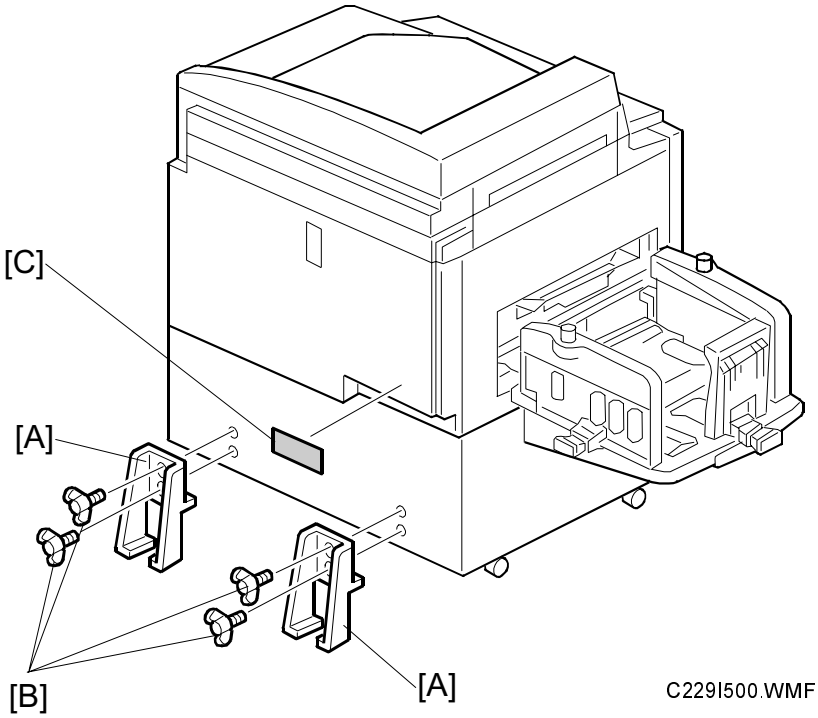
   NOTE: Gently pull out the lever [C] to release the flat cable, as shown. It can easily be damaged. Also, when reconnecting it, carefully push it back as shown [D].

2. Remove 7 screws securing the MPU bracket to flip over the MPU.



ADF harness installation

1. Remove the rear cover (6 screws) and the DF connector cover (2 screws).
2. Swing out the MPU bracket [A] (6 screws).
3. Run the DF harness (accessory), as shown, and fasten it with the clamps [B] (5 clamps), which were originally used in the main body.
4. Connect the cable connector [C] to CN216 on the I/O board.
5. Attach the connector [D] at the opposite end to the connector bracket (2 screws).

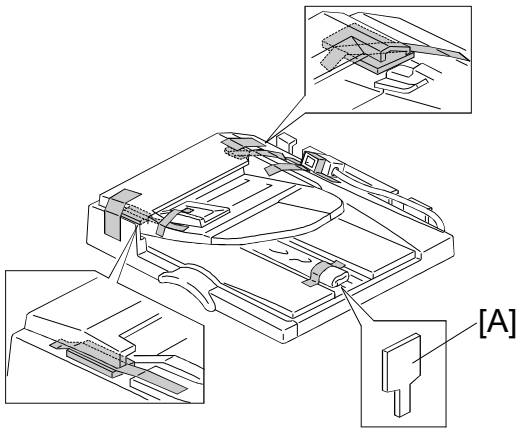


ADF stabilizer installation

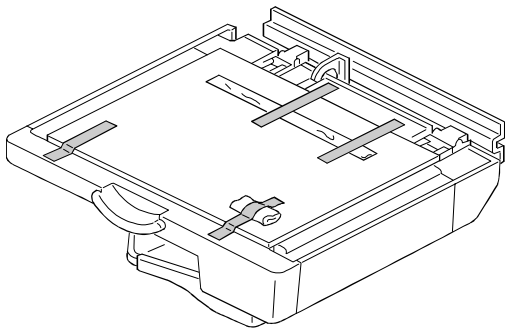
1. Attach the two stabilizer brackets [A] to the back of the table using the thumbscrews [B] (4 screws). All components are in the accessories.
2. Attach the caution label [C], as shown.

⚠CAUTION

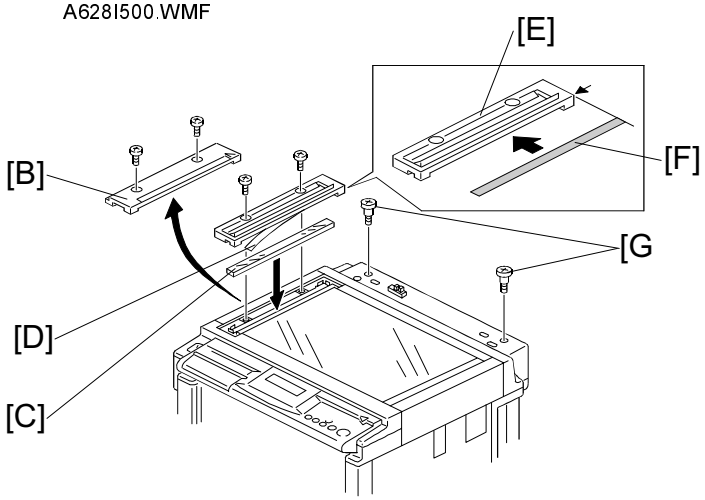
This procedure must be done to prevent the machine from falling backwards when the ADF is open.



A628I500.WMF



A628I501.WMF



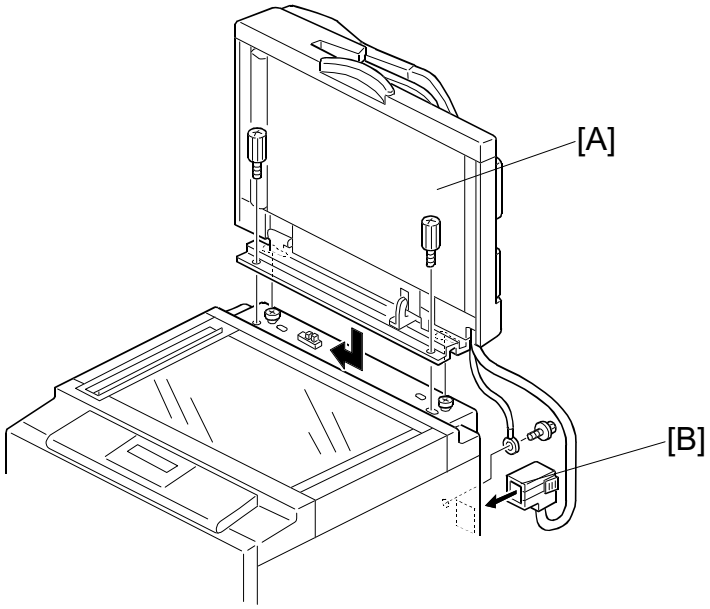
A628I502.WMF

⚠CAUTION

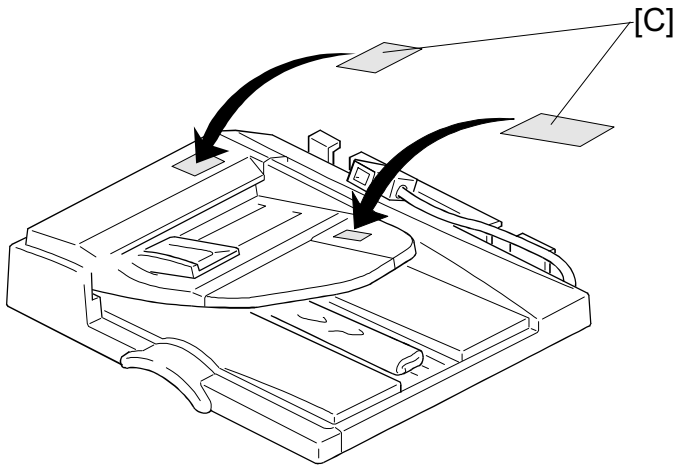
Unplug the main body power cord before starting the following procedure.
When installing the DF, use the DF tool [A] or a standard screwdriver.

ADF installation

1. Unplug the document feeder. Then, remove the shipping tape.
2. Remove the left scale [B] (2 screws).
3. Place the DF exposure glass [C] on the glass holder.
4. Peel off the backing [D] of the double side tape attached to the rear side of the scale guide [E], then install the scale guide (2 screws).
5. Attach the original size decal [F] to the scale guide.
   NOTE: Place the decal at the rear edge, and the left side flush with the scale paper guide [E], as shown.
6. Install the stud screws [G].



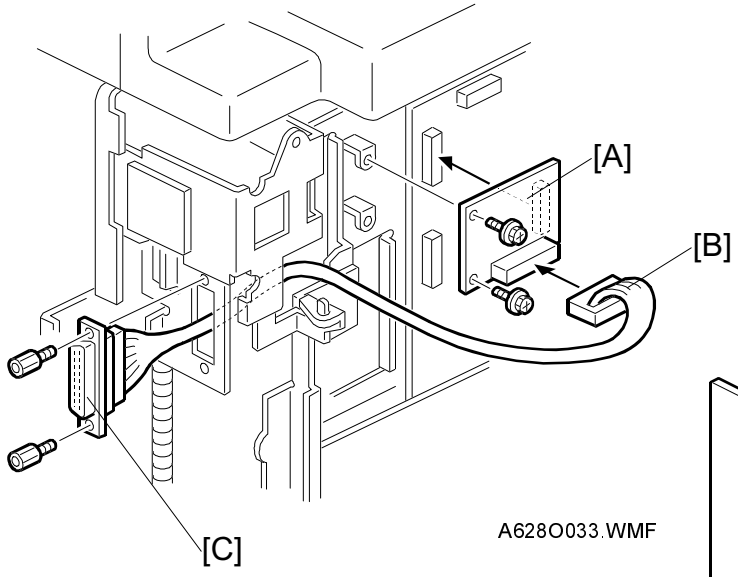
A628O032.WMF



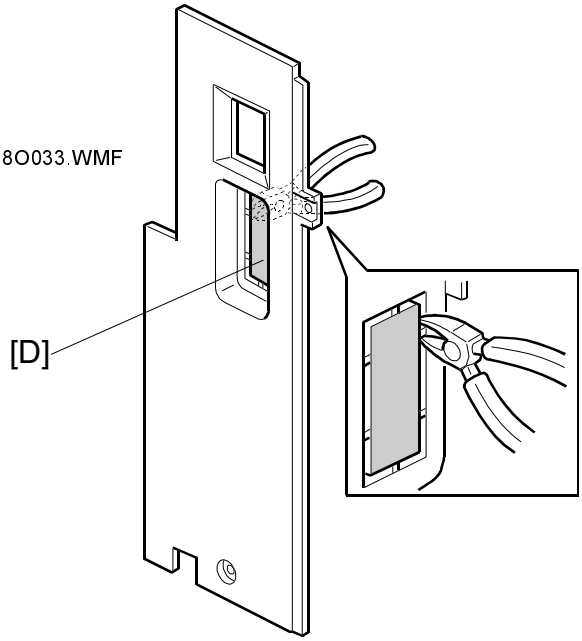
A628I505.WMF

7. Install the DF unit [A].
8. Slide the DF to the left, then secure the DF unit with the 2 screws (M4×10).
9. Connect the I/F harness [B] to the main body.
10. Attach the original direction decals [C] to the DF table, as shown.
11. Turn the main switch on. Then, check if the document feeder works properly.

3.2.3 INTERFACE BOARD (OPTION)



A628O033.WMF



A628O034.WMF

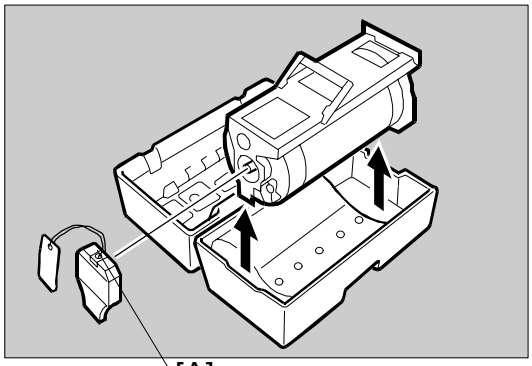
NOTE: The interface board is originally installed in the U.S.A and European version models as a standard part, not an option.

1. Remove the rear cover and the right rear cover.
2. Install the I/F board [A] in CN102 on the MPU (2 screws).
3. Connect the cable [B] (accessory) to the I/F board.
4. Attach the connector [C] at the opposite end to the connector bracket (2 screws).
5. Cut away the blindfold cover [D] on the right rear cover.

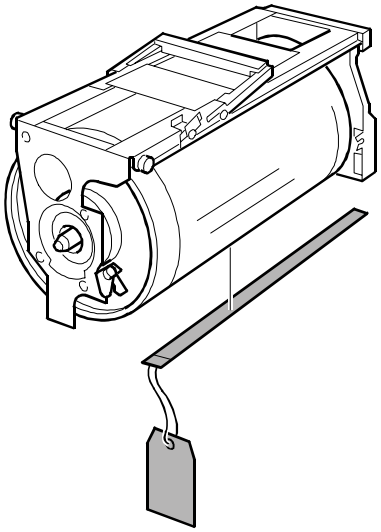
3.2.4 COLOR DRUM (OPTION)

There are two types of color drum units:

- Color Drum – A3 Drum
- Color Drum – A4 Drum

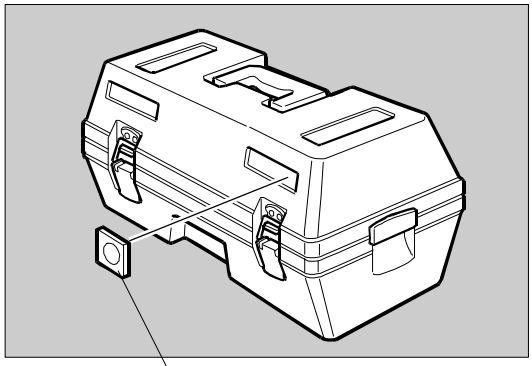


C229I026.WMF



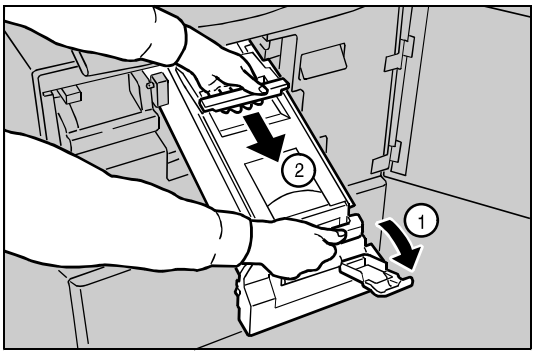
C229I011.WMF

1. Take the color drum out of the drum case. Remove the holder [A].
2. Remove the protective paper in the master clamper.



C229I027.WMF

[B]



C229I017.WMF

3. Attach the appropriate color decal (accessory) [B] to the drum case.
4. Remove the original drum, as shown.
5. Install the color drum in the machine.

4. SERVICE TABLES

4.1 SERVICE REMARKS

4.1.1 SCANNER SECTION

1. Xenon Lamp

Do not touch the xenon lamp while it is on, or you might receive a weak electrical shock.

2. Scanner Wire Installation

A special tool is needed. See “6.5.7 Scanner Wire.”

3. Sensor Board Unit (SBU) Calibration

When the MPU is replaced or the standard white plate located behind the original scale is replaced, the SBU must be calibrated with SP6-32-1.

4.1.2 MASTER EJECT SECTION

1. Master Pick-up Roller Drive Gear and Master Clamper Drive Arm Positions

These parts must be positioned correctly. See "6.6.4 Reassembling the Master Pick-up Roller Drive Gears."

4.1.3 MASTER FEED SECTION

1. Thermal Head 1

When installing the thermal head, there are important points to note. See "Remarks for Handling the Thermal Head" in "2.2.7 Thermal Head."

2. Thermal Head 2

When replacing the thermal head, be sure to adjust the voltage supplied to the thermal head (See “6.7.6 Thermal Head Voltage Adjustment”).

3. Master Vacuum Fan Position

The fan must be positioned correctly. See "6.7.5 Master Vacuum Fan Positioning."

4. Master Feed Mylar Positions

When replacing or removing the thermal head, the cutter unit, the master duct, or the guide plate of the lower master feed control roller, the strips of mylar are easily put in the wrong position while installing the lower tension roller or lower master feed control roller. For details, refer to "6.7.10 Master Feed Mylar Positioning."

4.1.4 PAPER FEED SECTION

1. Paper Feed Roller and Paper Separation Roller 1

Be careful to install the rollers the correct way around. They have a one-way clutch inside.

2. Paper Feed Roller and Paper Separation Roller 2

Do not touch the surfaces of the rollers with bare hands.

4.1.5 DRUM AND DRUM DRIVE SECTION

1. Doctor Roller

Normally the doctor roller gap is not adjusted or changed. It tends to be difficult to adjust in the field. If the gap becomes narrower, an uneven image may appear on the prints. If it becomes wider, too much ink will be applied to the drum screens, resulting in ink leakage from the drum.

2. Drum Master Clamper

1) Do not allow the inside of the clamping plate to become dirty with ink.
2) Do not use alcohol or other solvents to clean the inside of the clamping plate. Use a cloth dampened with water.

3. Ink Roller Unit

Do not disassemble the ink roller unit. Each part between the front and rear side plates of this unit has been precisely adjusted on the production line to keep the doctor and ink rollers parallel against the drum shaft.

4.1.6 MAIN DRIVE SECTION

1. Main Drive Adjustment

Special tools are needed for the adjustment. For details, see "6.11.2 Main Drive Mechanism (Main Timing Belt)."

4.1.7 ELECTRICAL COMPONENTS

1. Main Processing Unit (MPU) and I/O Board

After replacing the MPU or I/O board, some adjustments are needed. See "6.3 MPU and I/O Board Replacement."

2. Main Processing Unit (MPU) and Power Supply Unit

To access the rear of the machine, the MPU and I/O board have to be moved out of the way. See "6.4 MPU and PSU Opening Procedures."

3. Power Supply Unit

When replacing the power supply unit, be sure to adjust the voltage supplied to the thermal head. See “6.7.6 Thermal Head Voltage Adjustment.”

4. Program Update

To update the software in the flash ROM on the MPU, a special tool is needed. See “4.5.4 Load Program (SP8-20).”

5. Sensor Adjustments

Adjustment is needed for the following sensors

1st drum master sensor
2nd drum master sensor
Master eject sensor
Master edge sensor
Master end sensor

For details, see the adjustment procedures for each sensor in section 6.

4.2 DIP SW, LED, VR, TP, AND FUSE TABLES

4.2.1 TEST POINTS

Ink Detection Board

Number	Usage
TP1	Ink Level
TP2	Ink Level
TP-12V	-12V

4.2.2 DIP SWITCHES

Ink Detection Board

Number	Standard A3 Drum	Optional A3 Drum	Optional A4 Drum	Not used
DPS901-1	ON	OFF	ON	OFF
DPS901-2	ON	ON	OFF	OFF

4.2.3 POTENTIOMETERS

I/O Board

Number	Usage
VR303	Master Eject Sensor Adjustment
VR304	Master End Sensor Adjustment (Do not adjust.)
VR305	1st Drum Master Sensor Adjustment
VR306	2nd Drum Master Sensor Adjustment
VR307	Master Edge Sensor Adjustment

Thermal Head Power Supply Board

Number	Usage
VR1	Thermal Head Voltage Adjustment

Ink Detection Board

Number	Usage
VR901	Ink Detection Board Adjustment

4.2.4 LED'S

MPU

Number	Function
LED101	Monitors the CPU operation. Usually, this LED is blinking.
LED102	Monitors power supplied to the MPU. Usually, this LED is lit.

I/O Board

Number	Function
LED300	Not used.
LED301	Not used.
LED302	Monitors the Master Eject Sensor.
LED303	Monitors the Master Edge Sensor.
LED304	Monitors the feed control CPU operation. Usually, this LED is blinking.
LED305	Monitors power supplied to the I/O board. Usually, this LED is lit.

4.2.5 FUSES

Power Supply Unit

Fuse	Rated Current	Protect
FU700	10A	Power Supply Unit
FU701	5A	Main Motor Drive Board
FU702	5A	Main Motor Drive Board
FU703	5A	I/O Board
FU704	5A	Thermal Head Power Supply Board, I/O Board

Thermal Head Power Supply Board

Fuse	Rated Current	Protect
FU750	2A	Thermal Head

Main Motor Control Board

Fuse	Rated Current	Protect
FUSE	10A	Main Motor

4.3 SERVICE CALL CODES

Code	Title	Conditions	Possible Causes
SC02-00	Scanner motor lock (the HP sensor remains off)	After the scanner has left home position, it does not return there for more than 7 seconds.	• Defective scanner HP sensor • Scanner wire slip-off • Defective scanner motor
SC02-01	Scanner motor lock (the HP sensor remains on)	At power on or when the Start key is pressed, the scanner does not move from the home position towards the scanning direction for more than 2 seconds.	• Defective scanner HP sensor • Scanner wire slip-off • Defective scanner motor
SC02-02	Scanner motor lock (the scanner does not return to HP)	At power on, the scanner does not return to the home position within 2 seconds after it left.	• Defective scanner HP sensor • Scanner wire slip-off • Defective scanner motor
SC03-00	Thermal head ID error	The CPU detects an abnormal ID signal from the thermal head.	• Defective thermal head • Defective MPU
SC03-01	Thermal head energy pulse error	The CPU detects an abnormal thermal head energy control pulse.	• Defective MPU • Defective PSU
SC03-02	Thermal head thermistor short	The signal from the thermal head thermistor reaches 4.88 volts.	• Thermistor open circuit • Related connector disconnected
SC03-03	Thermal head temperature abnormal	When the Start key is pressed, a temperature of 54 °C or more is detected at the thermal head.	• Thermistor short • Defective thermal head
SC04-00	Cutter HP sensor remains on	The cutter does not leave the home for more than 3 seconds after the cutter motor on signal is generated.	• Defective sensor • Defective motor • Jammed master
SC04-01	Cutter HP sensor remains off	The cutter does not return to the home for more than 3 seconds after the cutter has left home	• Defective sensor • Defective motor • Jammed master
SC04-10	Platen release sensor remains on	The sensor is not de-activated for more than 5 seconds after the platen release motor on signal is generated.	• Defective sensor • Defective motor
SC04-11	Platen release sensor remains off	The sensor is not activated for more than 5 seconds after the platen release motor on signal is generated.	• Defective sensor • Defective motor

Code	Title	Conditions	Possible Causes
SC04-20	Master cut error	If the master edge sensor remains on even after the first master cut recovery operation. (Normally, the master is cut if the master edge sensor detects a mis-cut master the first time.)	• Defective master edge sensor • Defective cutter unit • Defective master vacuum fans • Jammed master
SC05-00	Main motor lock (1st drum position sensor does not turn on)	At power on or when the drum returns to home position, the 1st drum position sensor is not activated for more than 3.75 seconds after the main motor on signal is generated.	• Defective sensor • Defective main motor
SC05-01	Main motor lock (motor control signal error)	The CPU on the motor control board detects an abnormal signal from the main motor encoder.	• Defective main motor
SC05-10	Image shift HP sensor remains on	At power on, the sensor is not de-activated for more than 25 seconds after the image shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-11	Image shift HP sensor remains off	At power on, the sensor is not activated for more than 25 seconds after the image shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-12	No image position encoder pulse	At power on or when the image up/down shift mode is selected, the CPU detects no encoder pulse from the sensor for more than 25 seconds after the image shift motor on signal is generated.	• Defective sensor
SC05-20	Drum shift HP sensor remains on	At power on, the sensor is not de-activated for more than 6 seconds after the drum shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-21	Drum shift HP sensor remains off	At power on, the sensor is not activated for more than 6 seconds after the drum shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-22	No drum shift sensor pulse	At power on or when the image side-to-side shift mode is selected, the CPU detects no encoder pulse from the sensor for more than 6 seconds after the drum shift motor on signal is generated.	• Defective sensor
SC05-30	Drum thermistor open	The signal from the thermistor beside the ink detecting pins reaches 4.5 volts.	• Thermistor open circuit • Related connector disconnected

Code	Title	Conditions	Possible Causes
SC05-31	Drum thermistor short	The thermistor beside the ink detecting pins detects an excessively high temperature (96 °C).	• Thermistor short
SC05-32	Ink pump sensor remains on	The sensor is not de-activated after the ink pump motor on signal is generated.	• Defective sensor • Defective motor • Jammed ink pump drive
SC05-33	Ink pump sensor remains off	The sensor is not activated after the ink pump motor on signal is generated.	• Defective sensor • Defective motor • Jammed ink pump drive
SC05-40	A4 cam sensor remains on	The sensor does not de-activate for more than 6 seconds after the pressure cam shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-41	A3 cam sensor remains off	The sensor does not activate for more than 6 seconds after the pressure cam shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-42	A3 cam sensor remains on	The sensor does not de-activate for more than 6 seconds after the pressure cam shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-43	A4 cam sensor remains off	The sensor does not activate for more than 6 seconds after the pressure cam shift motor on signal is generated.	• Defective sensor • Defective motor
SC05-50	Clamper close position sensor remains on when opening the clamper	At the master clamper open timing, the sensor is not de-activated for more than 4 seconds after the clamper motor on signal is generated.	• Defective sensor • Defective motor • Jammed drum guide drive • Defective 2nd drum position sensor
SC05-51	Clamper open position sensor remains off when opening the clamper	At the master clamper open timing, the sensor is not activated for more than 4 seconds after the clamper motor on signal is generated.	• Defective sensor • Defective motor • Jammed drum guide drive • Defective 2nd drum position sensor
SC05-52	Clamper open position sensor remains on when opening the clamper	At the master clamper open timing, the sensor is not de-activated for more than 4 seconds after the clamper motor on signal is generated.	• Defective sensor • Defective motor • Jammed drum guide drive • Defective 2nd drum position sensor

Code	Title	Conditions	Possible Causes
SC05-53	Clamper open position sensor remains off when closing the clamper	At the master clamper closing timing, the sensor is not activated for more than 4 seconds after the clamper motor on signal is generated.	• Defective sensor • Defective motor • Jammed drum guide drive • Defective 2nd drum position sensor
SC05-54	Clamper open position sensor remains on when closing the clamper	At the master clamper closing timing, the sensor is not de-activated for more than 4 seconds after the clamper motor on signal is generated.	• Defective sensor • Defective motor • Jammed drum guide drive • Defective 2nd drum position sensor
SC05-55	Clamper close position sensor remains off when closing the clamper	At the master clamper closing timing, the sensor is not activated for more than 4 seconds after the clamper motor on signal is generated.	• Defective sensor • Defective motor • Jammed drum guide drive • Defective 2nd drum position sensor
SC05-60	Idling HP sensor remains on	The sensor does not de-activate after the idling roller motor on signal is generated.	• Defective sensor • Defective motor
SC05-61	Idling HP sensor remains off	The sensor does not activate after the idling roller motor on signal is generated.	• Defective sensor • Defective motor
SC06-00	Pressure plate does not move from home to the master eject ready position	The pressure plate does not reach the master eject ready position after it has left home for more than 3 seconds after the pressure plate motor on signal is generated.	• Defective sensor • Defective motor • Jammed master
SC06-01	Pressure plate does not return to the home position	The pressure plate does not reach the home position for more than 6 seconds after the pressure plate motor on signal is generated.	• Defective sensor • Defective motor • Jammed master
SC06-02	Pressure plate does not move to the compression position	The pressure plate does not reach home while traveling from the master eject ready position to compression position for more than 6 seconds after the pressure plate motor on signal is generated.	• Defective sensor • Defective motor • Jammed master
SC07-00	Sensor 0 in the feed pressure detection board remains on	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor

Code	Title	Conditions	Possible Causes
SC07-01	Sensor 0 in the feed pressure detection board remains off	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-02	Sensor 1 in the feed pressure detection board remains on	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-03	Sensor 1 in the feed pressure detection board remains off	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-04	Sensor 2 in the feed pressure detection board remains on	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-05	Sensor 2 in the feed pressure detection board remains off	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-06	Sensor 3 in the feed pressure detection board remains on	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-07	Sensor 3 in the feed pressure detection board remains off	The sensor does not change status.	• Defective feed pressure detection board • Defective feed pressure motor
SC07-10	Sensor 0 in the separation pressure detection board remains on	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-11	Sensor 0 in the separation pressure detection board remains off	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor

Code	Title	Conditions	Possible Causes
SC07-12	Sensor 1 in the separation pressure detection board remains on	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-13	Sensor 1 in the separation pressure detection board remains off	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-14	Sensor 2 in the separation pressure detection board remains on	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-15	Sensor 2 in the separation pressure detection board remains off	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-16	Sensor 3 in the separation pressure detection board remains on	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-17	Sensor 3 in the separation pressure detection board remains off	The sensor does not change status.	• Defective separation pressure detection board • Defective separation pressure motor
SC07-20	Feed encoder error	The CPU detects an abnormal signal from the feed encoder.	• Defective I/O board • Defective sensor
SC07-50	Wing lower position sensor remains on	At the wing guide moving upwards timing, the sensor is not de-activated for more than 6 seconds after the wing guide motor on signal is generated.	• Defective sensor • Defective motor
SC07-51	Wing upper position sensor remains off	At the wing guide moving upwards timing, the sensor is not activated for more than 6 seconds after the wing guide motor on signal is generated.	• Defective sensor • Defective motor
SC07-52	Wing upper position sensor remains on	At the wing guide moving downwards timing, the sensor is not de-activated for more than 6 seconds after the wing guide motor on signal is generated.	• Defective sensor • Defective motor

Code	Title	Conditions	Possible Causes
SC07-53	Wing lower position sensor remains off	At the wing guide moving downwards timing, the sensor is not activated for more than 6 seconds after the wing guide motor on signal is generated.	• Defective sensor • Defective motor
SC07-60	Paper sensor (in the job separator) remains on	At the slider moving upwards timing, the sensor is not de-activated for more than 9 seconds after the slider lift motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC07-61	Slider upper limit sensor remains off	At the slider moving upwards timing, the sensor is not activated for more than 9 seconds after the slider lift motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC07-62	Slider upper limit sensor remains on	At the slider moving downwards timing, the sensor is not de-activated for more than 9 seconds after the slider lift motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC07-63	Paper sensor (in job separator) remains off	At the slider moving downwards timing, the sensor is not activated for more than 9 seconds after the slider lift motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC07-70	Slider HP sensor remains on	At the slider moving toward the delivery table timing, the sensor is not de-activated for more than 6 seconds after the job separator motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC07-72	Slider position sensor remains on when slider returns	At the slider returning timing, the sensor is not de-activated for more than 6 seconds after the job separator motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC07-73	Slider HP sensor remains off when slider returns	At the slider returning timing, the sensor is not activated for more than 6 seconds after the job separator motor on signal is generated.	• Defective sensor • Defective motor • Defective job separator board
SC30-00	Paper table lower limit sensor remains on	At the table moving upwards timing, the sensor is not de-activated for more than 7.5 seconds after the paper table motor on signal is generated.	• Defective sensor • Defective motor
SC30-01	Paper height sensor remains off	At the table moving upwards timing, the sensor is not activated for more than 7.5 seconds after the paper table motor on signal is generated.	• Defective sensor • Defective motor

Code	Title	Conditions	Possible Causes
SC30-02	Paper height sensor remains on	At the table moving downwards timing, the sensor is not de-activated for more than 7.5 seconds after the paper table motor on signal is generated.	• Defective sensor • Defective motor
SC30-03	Paper table lower limit sensor remains off	At the table moving downwards timing, the sensor is not activated for more than 7.5 seconds after the paper table motor on signal is generated.	• Defective sensor • Defective motor
SC80-00	PC controller interface signal error	Signal transmission error in the interface board.	• Defective interface board

4.4 SPECIAL TOOLS

The following are the special tools used for service.

Description	Part Number	Application
Main Drive Securing Tool Kit (Drum securing tool and two positioning shafts as a set)	C229 9000	For main drive positioning (See 6.11.2 Main Drive Mechanism section)
ROM Board - 2	A193 9351	For program download (See 4.5.4 Load Program section)
Scanner Positioning Pin Kit (4 pins as a set)	A006 9104	For scanner wire installation (See 6.5.7 Scanner Wire section)

4.5 SERVICE PROGRAM MODE

The service program (SP) mode is used to check electrical data, change modes, or change adjustment values.

4.5.1 ACCESS PROCEDURE

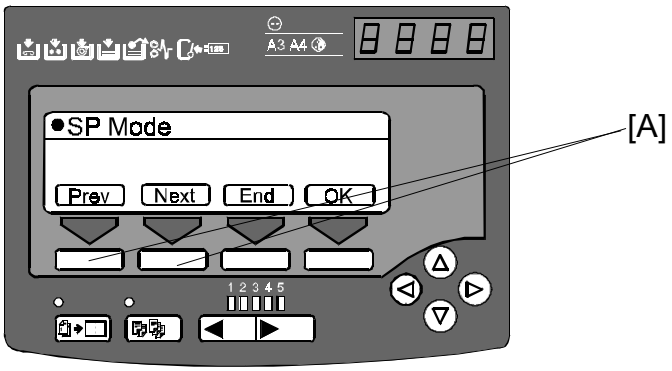
Service Program Mode Access Procedure (For Engineers)

1. Press the following keys on the operation panel in the following order:

   Clear Modes ⇒ 1 ⇒ 0 ⇒ 7 ⇒ Clear/Stop

   *: Hold down the Clear/Stop key for more than 3 seconds.

2. The following is displayed on the LCD when the SP mode is accessed.



C229M500.WMF

3. Using the **number keys**, enter the desired **Main Menu Number** (listed below and in the service program table), then press the **OK** key on the bottom of the LCD (or the **Enter (#)** key).

   NOTE: The main menu number can be shifted up or down by pressing the **Prev.** or **Next** key [A] on the bottom of the LCD.

Main Menu Numbers List

1.Data Logging
2.Basic Settings
3.User Custom Settings
4.Input Test Mode
5.Output Test Mode
6.System Adjustment
7.Memory Data Clear
8.System Test

4. Using the **number keys**, enter the desired **Sub Menu Number** (listed in the service program table), then press the **OK** key on the bottom of the LCD (or the **Enter (#)** key).

   NOTE: The sub menu number can be shifted up or down by pressing the **Prev.** or **Next** key [A] on the bottom of the LCD.

5. Not for all sub menu items but for some, there are menus under the sub menu. Using the **Prev.** or **Next** key [A] on the bottom of the LCD, select the desired menu.

   NOTE: These menus are not accessible by entering the number with the number keys.

6. Follow the "Change Adjustment Values or Modes" procedure below.

   NOTE: To cancel the SP mode, press the **Clear Modes key** or the **Return** (or **End**) key on the bottom of the LCD.

Change Adjustment Values or Modes

1. After entering the desired SP mode, pressing the **OK** key on the bottom of the LCD (or the **Enter (#)** key). The current value or mode will be displayed on the LCD (at the end of the second line).
2. Enter the desired value or mode using the **number keys** (listed in the service program table).

   NOTE: Use the ⊡ key to toggle between + and -.
3. Press the **OK** key to store the desired value or mode.
4. To cancel the SP mode, press the **Clear Modes key** or the **Return** (or **End**) key on the bottom of the LCD.

4.5.2 SERVICE PROGRAM TABLE

Main Menu Number List

1.Data Logging
2.Basic Settings
3.User Custom Settings
4.Input Test Mode
5.Output Test Mode
6.System Adjustment
7.Memory Data Clear
8.System Test

1. Data Logging

SP No.	Display	Function	Default	User Tools
1-001-1	Total Master Counter	Master counters 1-001-1: Total count 1-001-2: User counter 1-001-3 to 27: Counters for various copy modes	0	-
1-001-2	Resettable Master Count		0	1-2
1-001-3	M Counter ADF Mode		0	-
1-001-4	M Counter Economy Mode		0	-
1-001-5	M Counter Combine 2		0	-
1-001-6	M Counter Combine 4		0	-
1-001-7	M Counter Enl. Mode		0	-
1-001-8	M Counter Red. Mode		0	-
1-001-9	M Counter Zoom Mode		0	-
1-001-10	M Counter Dir. Mag.		0	-
1-001-11	M Counter Make-up Mode		0	-
1-001-12	M Counter Make-up Photo		0	-
1-001-13	M Counter Margin Erase		0	-
1-001-14	M Counter Online Mode		0	-
1-001-15	M Counter Online Overlay		0	-
1-001-16	M Counter Overlay Mode		0	-
1-001-17	M Counter Format Overlay		0	-
1-001-18	M Counter Memory Combine		0	-
1-001-19	M Counter Date Stamp		0	-
1-001-20	M Counter Page Number		0	-
1-001-21	M Counter Default Stamp		0	-
1-001-22	M Counter User Stamp		0	-
1-001-23	M Counter Letter Mode		0	-
1-001-24	M Counter Ltr/Pht Mode		0	-
1-001-25	M Counter Photo Mode		0	-
1-001-26	M Counter Pencil Mode		0	-
1-001-27	M Counter Tint Mode		0	-

SP No.	Display	Function	Default	User Tools
1-001-28	M Counter A3/DLT	Master counters 1-001-28 to 34: Original sizes 1-001-35, 36, 44 to 48: Various copy modes 1-001-39 to 43: Various types	0	-
1-001-29	M Counter B4/LG		0	-
1-001-30	M Counter A4-L/LT-L		0	-
1-001-31	M Counter A4/LT		0	-
1-001-32	M Counter B5-L		0	-
1-001-33	M Counter B5		0	-
1-001-34	M Counter Other Sizes		0	-
1-001-35	M Counter Up/Down Sift		0	-
1-001-36	M Counter Side Shift		0	-
1-001-37	M Counter Short Master		0	-
1-001-38	M Counter Image Rotation		0	-
1-001-39	M Counter Special		0	-
1-001-40	M Count Standard Paper		0	-
1-001-41	M Counter Thick Paper		0	-
1-001-42	M Counter User 1 Paper		0	-
1-001-43	M Counter User 2 Paper		0	-
1-001-44	M Counter Same-No. Class		0	-
1-001-45	M Counter By-Class Class		0	-
1-001-46	M Counter Manual Class		0	-
1-001-47	M Counter Job Separator		0	-
1-001-48	M Counter Autocycle		0	-
1-002-1	Total Print Counter	Print counters '-L': Lengthwise	0	-
1-002-2	Resettable Print Counter		0	1-2
1-002-3	P Counter Color Drum		0	-
1-002-4	P Counter Over A3/DLT		0	-
1-002-5	Print Counter A3/DLT		0	-
1-002-6	Print Counter B4/LG		0	-
1-002-7	Print Counter A4-L/LT-L		0	-
1-002-8	Print Counter A4/LT		0	-
1-002-9	Print Counter B5-L		0	-
1-002-10	Print Counter B5		0	-
1-002-11	Print Counter A6-L		0	-
1-002-12	Print Counter Under A6-L		0	-
1-002-13	P Counter Other Sizes		0	-
1-003	Set Master Counter		0	-
1-004	Ejected Master Counter		0	-
1-005	Ink Pump Rotation Count		0	-
1-006	Master End Counter		0	-
1-007	Ink End Counter		0	-
1-008	Master Full Counter		0	-
1-020	Original Counter ADF		0	-
1-021	Original Counter Platen		0	-
1-030-1	UC M Counter: Code 1	Master and printer counters for each user code	0	-
1-030-2	UC P Counter: Code 1		0	-

SP No.	Display	Function	Default	User Tools
1-030-3	UC M Counter: Code 2	Master and printer counters for each user code	0	-
1-030-4	UC P Counter: Code 2		0	-
1-030-5	UC M Counter: Code 3		0	-
1-030-6	UC P Counter: Code 3		0	-
1-030-7	UC M Counter: Code 4		0	-
1-030-8	UC P Counter: Code 4		0	-
1-030-9	UC M Counter: Code 5		0	-
1-030-10	UC P Counter: Code 5		0	-
1-030-11	UC M Counter: Code 6		0	-
1-030-12	UC P Counter: Code 6		0	-
1-030-13	UC M Counter: Code 7		0	-
1-030-14	UC P Counter: Code 7		0	-
1-030-15	UC M Counter: Code 8		0	-
1-030-16	UC P Counter: Code 8		0	-
1-030-17	UC M Counter: Code 9		0	-
1-030-18	UC P Counter: Code 9		0	-
1-030-19	UC M Counter: Code10		0	-
1-030-20	UC P Counter: Code10		0	-
1-030-21	UC M Counter: Code11		0	-
1-030-22	UC P Counter: Code11		0	-
1-030-23	UC M Counter: Code12		0	-
1-030-24	UC P Counter: Code12		0	-
1-030-25	UC M Counter: Code13		0	-
1-030-26	UC P Counter: Code13		0	-
1-030-27	UC M Counter: Code14		0	-
1-030-28	UC P Counter: Code14		0	-
1-030-29	UC M Counter: Code15		0	-
1-030-30	UC P Counter: Code15		0	-
1-030-31	UC M Counter: Code16		0	-
1-030-32	UC P Counter: Code16		0	-
1-030-33	UC M Counter: Code17		0	-
1-030-34	UC P Counter: Code17		0	-
1-030-35	UC M Counter: Code18		0	-
1-030-36	UC P Counter: Code18		0	-
1-030-37	UC M Counter: Code19		0	-
1-030-38	UC P Counter: Code19		0	-
1-030-39	UC M Counter: Code20		0	-
1-030-40	UC P Counter: Code20		0	-
1-031-1	UC Total Master Counter		0	-
1-031-2	UC Total Print Counter		0	-
1-040	ROM Part Number		-	-
1-041	Machine Serial Number	Enter data with SP3-70 at installation if required.	-	-
1-042	ROM Version		-	-

SP No.	Display	Function	Default	User Tools
1-050	Service Telephone Number	Enter data with SP3-72 at installation if required.	0	-
1-051	Last Service Call Code		0	-
1-060	Power On Time		0	-
1-070-1	1 - 5 Prints	Copies-per-original counters	0	-
1-070-2	6 - 10 Prints		0	-
1-070-3	11 - 20 Prints		0	-
1-070-4	21 - 30 Prints		0	-
1-070-5	31 - 50 Prints		0	-
1-070-6	51 - 70 Prints		0	-
1-070-7	71 - 100 Prints		0	-
1-070-8	101 - 200 Prints		0	-
1-070-9	201 - 500 Prints		0	-
1-070-10	501 - 1000 Prints		0	-
1-070-11	Over 1000 Prints		0	-
1-080	Misfeed Setting Counter	Number of times the user changed the 'Misfeed' or 'Multifeed' settings for paper feed or separation pressures	0	-
1-081	Multifeed Setting Count		0	-
1-082	Start Error Message Cnt.	Number of times an error message appeared when the Start key was pressed	0	-
1-102-1	Jam DF Feed-in Error	Counters for various types of jams	0	-
1-102-2	Jam DF Feedout Error		0	-
1-104-1	Jam Master Set Error		0	-
1-104-2	Jam Master Clamp Error		0	-
1-104-3	Jam Master Cut Error		0	-
1-106-1	Jam Master Eject ON Chk		0	-
1-106-2	Jam Pressure Plate Error		0	-
1-106-3	Jam Master Eject OFF Chk		0	-
1-107-1	Jam Regist ON Check		0	-
1-107-2	Jam Feed Timing ON Check		0	-
1-107-3	Jam Feed Timing OFF Chk		0	-
1-107-4	Jam Paper Upper Wrapping		0	-
1-107-5	Jam Paper Lower Wrapping		0	-
1-107-6	Jam Paper Exit OFF Check		0	-
1-202-1	Jam% DF Feed-in Error	Jam ratio for various types of jam	0	-
1-202-2	Jam% DF Feed-out Error		0	-
1-204-1	Jam% Master Set Error		0	-
1-204-2	Jam% Master Clamp Error		0	-
1-204-3	Jam% Master Cut Error		0	-
1-206-1	Jam% Master Eject ON Chk		0	-
1-206-2	Jam% Press Plate Error		0	-

SP No.	Display	Function	Default	User Tools
1-206-3	Jam% M Eject OFF Check		0	-
1-207-1	Jam% Regist ON Check		0	-
1-207-2	Jam% Feed Timing ON Chk	Jam ratio for various types of jam	0	-
1-207-3	Jam% Feed Timing OFF Chk		0	-
1-207-4	Jam% Paper Upper Wrap		0	-
1-207-5	Jam% Paper Lower Wrap		0	-
1-207-6	Jam% Paper Exit OFF Chk		0	-
1-300-1	Jam P0 A3/B4 Standard	Feed-in jams and registration roller jams for various paper sizes and paper types '-L': Lengthwise	0	-
1-300-2	Jam P0 A3/B4 Thick		0	-
1-300-3	Jam P0 A3/B4 Others		0	-
1-300-4	Jam P0 A4/B5-L Standard		0	-
1-300-5	Jam P0 A4/B5-L Thick		0	-
1-300-6	Jam P0 A4/B5-L Others		0	-
1-300-7	Jam P0 A4/B5 Standard		0	-
1-300-8	Jam P0 A4/B5 Thick		0	-
1-300-9	Jam P0 A4/B5 Others		0	-
1-300-10	Jam P0 Other Sizes Std		0	-
1-300-11	Jam P0 Other Sizes Thick		0	-
1-300-12	JamP0 Other Sizes Others		0	-
1-301-1	Jam P1 A3/B4 Standard	Registration roller jams (In case if the paper feed timing sensor stays on) for various paper sizes and paper types '-L': Lengthwise	0	-
1-301-2	Jam P1 A3/B4 Thick		0	-
1-301-3	Jam P1 A3/B4 Others		0	-
1-301-4	Jam P1 A4/B5-L Standard		0	-
1-301-5	Jam P1 A4/B5-L Thick		0	-
1-301-6	Jam P1 A4/B5-L Others		0	-
1-301-7	Jam P1 A4/B5 Standard		0	-
1-301-8	Jam P1 A4/B5 Thick		0	-
1-301-9	Jam P1 A4/B5 Others		0	-
1-301-10	Jam P1 Other Sizes Std		0	-
1-301-11	Jam P1 Other Sizes Thick		0	-
1-301-12	JamP1 Other Sizes Others		0	-
1-302-1	Jam P2 A3/B4 Standard	Upper wrap, lower wrap, and feed-out jams for various paper sizes and paper types '-L': Lengthwise	0	-
1-302-2	Jam P2 A3/B4 Thick		0	-
1-302-3	Jam P2 A3/B4 Others		0	-
1-302-4	Jam P2 A4/B5-L Standard		0	-
1-302-5	Jam P2 A4/B5-L Thick		0	-
1-302-6	Jam P2 A4/B5L Others		0	-
1-302-7	Jam P2 A4/B5 Standard		0	-
1-302-8	Jam P2 A4/B5 Thick		0	-
1-302-9	Jam P2 A4/B5 Others		0	-
1-302-10	Jam P2 Other Sizes Std		0	-
1-302-11	Jam P2 Other Sizes Thick		0	-
1-302-12	Jam P2 Other Sizes Others		0	-

SP No.	Display	Function	Default	User Tools
1-303-1	P Count A3/B4 Standard	Print counters for various paper sizes and paper types	0	-
1-303-2	P Count A3/B4 Thick		0	-
1-303-3	P Count A3/B4 Others		0	-
1-303-4	P Count A4/B5-L Standard		0	-
1-303-5	P Count A4/B5-L Thick		0	-
1-303-6	P Count A4/B5L Others		0	-
1-303-7	P Counter A4/B5 Standard		0	-
1-303-8	P Count A4/B5 Thick		0	-
1-303-9	P Count A4/B5 Others		0	-
1-303-10	P Count Other Sizes Std		0	-
1-303-11	P Count Other Sizes Thk	Master error counters for different temperature conditions (temperature detected by the thermistor in the drum)	0	-
1-303-12	P Cnt Other Sizes Others		0	-
1-304-1	M Set Error Low Temp		0	-
1-304-2	M Set Error Normal Temp		0	-
1-304-3	M Set Error High Temp		0	-
1-305-1	M Clamp Error Low Temp		0	-
1-305-2	M Clamp Error Nor. Temp		0	-
1-305-3	M Clamp Error High Temp		0	-
1-306-1	M Cut Error Low Temp		0	-
1-306-2	M Cut Error Normal Temp		0	-
1-306-3	M Cut Error High Temp		0	-
1-307-1	M Eject ON Jam Low Temp		0	-
1-307-2	M Eject ON Jam Nor Temp		0	-
1-307-3	M Eject ON Jam High Temp		0	-
1-308-1	Press Plate Error Low		0	-
1-308-2	Press Plate Error Normal		0	-
1-308-3	Press Plate Error High		0	-
1-309-1	M Eject OFF Jam Low Temp		0	-
1-309-2	M Eject OFF Jam Nor Temp		0	-
1-309-3	M Eject OFF Jam High Tem		0	-

2. Basic Settings

SP No.	Display	Function	Default	Setting	User Tools
2-002	Set Key Counter	Also see 2-291.	No	No/Yes	-
2-003	Set Key Card	Japan only	No	No/Yes	-
2-006	PC Controller Settings	Do not adjust.	AUTO	AUTO / 10PS	1-9
2-010	Sizes in Metric or Inch		-	0:JPN 1:mm 2:Inch	1-6
2-011	Select Language Type	See Note 1.	-	0 to 6	-
2-020-1	Default Original Mode	Defaults for various user settings See Notes 2 to 9.	0	0 to 3	3-3
2-020-2	Default Tint Mode		OFF	ON/OFF	3-8
2-020-3	Default Paper Type		1	0 to 4	3-1
2-020-4	Default Master Density		1	0 to 3	3-2
2-020-5	Default Print Speed		3	1 to 5	-
2-020-6	Default Auto Cycle Mode		ON	ON/OFF	4-1
2-020-7	Def Image Position Tp/Btm		0	-15.0 to 15.0	-
2-020-8	Def Image Position Lt/Rt		0	-10.0 to 10.0	-
2-020-9	Default Photo/Lightness		1	0 to 2	3-6
2-020-10	Default Photo/Screen		0	0 to 4	3-7
2-020-11	Def On-line Paper Size		14	0 to 14	3-10
2-020-12	Default Make-up Pattern1		0	0 to 43	-
2-020-13	Default Make-up Pattern2		0	0 to 43	-
2-020-14	Default Make-up Pattern3		0	0 to 43	-
2-020-15	Default Make-up Pattern4		0	0 to 43	-
2-030	Panel Beeper	See Note 10.	1	0 to 2	2-5
2-031	Background Correction	See Note 11.	No	No/Yes	4-6
2-032-1	TH Egy Temp Ctl - Black	See Note 12	ON	ON/OFF	-
2-032-2	TH Egy Temp Ctl - Color		OFF	ON/OFF	
2-040	Ink Detection	Enables/disables various sensors for test purposes 2-042-2: OFF means that the indicators are on. 2-046-2: See Note 13.	ON	ON/OFF	-
2-041	Paper Length Detection		ON	ON/OFF	-
2-042-1	Paper Width Detection		ON	ON/OFF	4-3
2-042-2	Paper Size Indicators		OFF	ON/OFF	-
2-043	Drum Master Detection		ON	ON/OFF	-
2-044	Platen Cover Set Detect		ON	ON/OFF	-
2-045	ADF Close Detection		ON	ON/OFF	-
2-046-1	Platen Orig. Size Detect		ON	ON/OFF	4-5
2-046-2	ADF Orig. Size Detect		ON	ON/OFF	4-4
2-060	Long Paper Mode	See Note 14.	OFF	ON/OFF	-
2-070	Auto Combine Originals	See Note 15.	NO	YES/NO	4-8
2-080	A3 Master 2 Count Up	See Note 16.	0	0 to 2	-
2-090	APS A5 Size Detection	See Note 17.	NO	YES/NO	-
2-100	User Code Mode		OFF	ON/OFF	1-4

SP No.	Display	Function	Default	Setting	User Tools
2-110	Auto Quality Start		ON	ON/OFF	4-13
2-120	Exit Wing Position	See Note 18.	0	0 to 2	4-15
2-150	Auto Image Rotation	See Note 19.	Yes	Yes/No	4-20
2-170	Auto Master Save Select	OFF: A3 master always used regardless of original size.	AUTO	AUTO / OFF	4-21
2-210	Ink Master Left	Also for master roll. See Note 20.	OFF	ON/OFF	4-18
2-220	Key Card Setting	Japan only	1	0 to 3	1-5
2-230	Copy Count Display		Down	Up / Down	2-3
2-240	Class Display Select	Japan only	Normal	School/ Normal	
2-241	Class Entry Per Orig.		Normal	By Orig / Normal	4-2
2-250	Combine Orig. Sep. Line	See Note 21.	0	0 to 4	4-9
2-260	Auto Combine Mode Reset		No	Yes/No	4-10
2-270	Print Restart in Class	See Note 22.	2	1 to 2	4-16
2-271	Job Sep. At Class Mode		Yes	Yes/No	4-17
2-290	Key Operator Code		OFF	ON/OFF	6-6
2-291	Restricted Access	See Note 23.	OFF	ON/OFF	6-8
2-300	Stamp Type	See Note 24.	0	0 to 6	5-1
2-301	Default Stamp Size	See Note 25.	0	0 to 3	5-2
2-302	Default Stamp Density	See Note 26.	0	0 to 2	5-3
2-303	Default Stamp Position	See Note 27.	0	0 to 9	5-4
2-304	User Stamp Size	See Note 28.	0	0 to 3	5-5
2-305	User Stamp Density		0	0 to 2	5-6
2-306	User Stamp Position		0	0 to 9	5-7
2-307	Date Stamp Type		m.d.'y	d.m.'y / m.d.'y	5-9
2-308	Date Stamp Position	See Note 29.	0	0 to 3	5-10
2-309	Page Numbering Type	See Note 30.	0	0 to 2	5-12
2-310	Default Page Position	See Note 31.	0	0 to 3	5-13
2-320	Skip Feed Mode Display		Yes	Yes/No	4-11
2-370	Ink Supply w/Trial Print	ON: Ink is supplied while a trial print is made after making a new master.	OFF	ON/OFF	-
2-380	Japanese Display Type	Do not use.	0	0 to 2	-
2-390	A3/DLT Drum Selection	See Note 32.	-	DLT/A3	-
2-400	User1 Paper Type	See Note 33.	0	0 to 5	4-19
2-401	User2 Paper Type		0	0 to 5	4-19

SP No.	Display	Function	Default	Setting	User Tools
2-410	Auto On-line Mode	YES: The on-line mode is automatically activated when data is sent from a PC (needs the optional PC controller)	No	Yes/No	-
2-420	Feed Friction Pad Type	Do not use.	Normal	Normal / Custom	-
2-421	Type of Thermal Head	Do not use.	2	1 to 2	-

Notes

1: 2-011 (Display language)

0: Japanese, 1: English, 2: German, 3: French, 4: Italian, 5: Spanish, 6: Dutch, 7: Chinese

2: 2-020-1 (Default original mode)

0: Letter, 1: Letter/Photo, 2: Photo, 3: Pencil

3: 2-020-3 (Default paper type)

0: Special, 1: Standard, 2: Thick, 3: User 1, 4: User 2

4: 2-020-4 (Default master density)

0: Pale, 1: Normal, 2: Fairly dark, 3: Dark

5: 2-020-5 (Default print speed, cpm)

1: 60, 2: 75, 3: 90, 4: 105, 5: 120

6: 2-020-9 (Default Photo/Lightness)

This is the default brightness in photo or letter/photo mode.

0: Dark, 1: Normal, 2: Light

7: 2-020-10 (Default Photo/Screen)

This is the default screen type for photo mode.

0: Standard, 1: Coarse 1, 2: Coarse 2, 3: Coarse 3, 4: Coarse 4 (coarsest)

8: 2-020-11 (Default On Line paper size)

This is the default paper size when the On Line key is pressed,

0: A3, 1: B4, 2: A4, 3: A4 lengthwise, 4: B5, 5: B5 lengthwise, 6: A5,
7: A5 lengthwise, 8: A6, 9: A6 lengthwise, 10 to 12: Not used, 13: Free, 14: Auto

Free – The master size is determined by the paper size sent from the PC.

Auto – The master size is determined by the paper size on the paper feed table. If the data from the PC is for a larger paper size, the excess data is lost.

Other settings: For example, if the setting is 0 (A3), the machine always makes an A3 master.

9: 2-020-12 to -15 (Default make-up patterns 1 to 4)

0 to 39: Preset patterns, from 1 to 40
40 to 43: User-created patterns A to D

10: 2-030 (Panel beeper)

0: Disabled, 1: Enabled (except for when keys pressed), 2: Enabled fully

11: 2-031 (Background correction)

This can be used in letter/photo, photo, and tint modes to prevent the background of an original from appearing on copies. See Detailed Section Descriptions – Image Processing for more details.

12: 2-032 (Thermal head energy control with temperature)

If this is switched on, the energy supplied to the thermal head will depend on the temperature measured by the thermistor in the drum.

	Less than 25 °C	25 – 30 °C	More than 30 °C
Standard	SP 3-020-1 value (Default: -7%)	SP 3-020-1 – 5% (Default: -12%)	SP 3-020-1 – 10% (Default: -17%)
Economy	SP 3-020-2 value (Default: -25%)		

13: 2-046-2 (ADF original size detection)

Disabling ADF original size detection allows the ADF to scan originals within the following range.

Width: 105 to 297 mm
Length: 128 to 864 mm

14: 2-060 (Long paper mode)

This disables trailing edge detection to allow long printer paper to be fed. This is not within specifications, so the machine's performance cannot be guaranteed using this mode.

15: 2-070 (Auto Combine Original mode)

This SP mode determines the use of the Combine key.

0: Normal – The Combine key accesses the Combine feature, in which two originals can be combined onto one copy

1: Automatic – The Combine key accesses the Auto Combine feature, in which the same original is printed twice or four times on the copy

This SP mode is only referred to when using the exposure glass. From the ADF, Auto Combine is always used if more than one original is placed.

The default is Normal.

16: 2-080 (Double count-up for A3 masters)

0: The counters go up by 1 only.

1: The master counter goes up by 2.

2: The master and print counters both go up by 2.

17: 2-090 (APS A5 Size Detection)

This determines how the machine behaves if the APS sensors cannot detect the original because it is too small

0: No original detected, 1: A5 assumed

Default: 0

18: 2-120 (Exit Wing Position)

This determines the position of the wings on the paper delivery table.

0: Auto (determined by the setting of SP6-100 for the currently-used paper type)

1: Always Up (regardless of SP6-100), 2: Always Down (regardless of SP6-100)

19: 2-150 (Auto Image Rotation)

If enabled, this feature rotates the scanned image if the original and printing paper are of the same size but different orientations.

0: Disabled, 1: Enabled

Default: Enabled

20: 2-210 (Ink Near-end Detection)

This SP mode enables and disables the display for ink and master roll near-end detection.

The machine determines how much of the master roll is remaining by subtracting the length of each master that is made.

In addition, it determines how much ink is left by counting the number of ink pump strokes that have been made.

The default is 0 (disabled). In this condition, the master and ink consumption is still monitored, but if a near-end condition occurs, it will not be displayed.

If this SP mode is changed to 1 (enabled), near-end will be displayed, but only for a few seconds when the machine has just been switched on.

21: 2-250 (Separation lines for Combine Original mode)

This can only be used with Memory Combine mode, using the optional memory board.

This determines the type of separation line printed on copies between the images of the different originals.

0: None (default), 1: Solid, 2: Broken line type A, 3: Broken line type B, 4: Crop marks

22: 2-270 (Print Restart in Class)

This determines how the machine behaves if the Job Separator feature is not used.

1: Auto Start – After printing for one class has been finished, there is a pause of a few seconds, then printing for the next class begins automatically. The short break allows the user to take the stack of prints off the delivery table.

2: Disabled (Default) – After printing for one class has been finished, the machine stops. The user must press Print to start printing for the next class.

23: 2-291 (Restricted Access)

When the key counter is installed, the technician enables the key counter with SP 2-002. However, the user can override this setting with SP 2-291 (which is also user tool 6-8).

OFF: Copies can be made even if the user has no key counter, regardless of SP 2-002.

ON: The user must have a key counter, if SP2-002 has been switched on.

The default is OFF, so to use the key counter, the user must switch 2-291 on using the equivalent user tool (6-8).

24: 2-300 (Stamp type)

This determines what the Stamping function (Stamp key) puts on the printouts.

25: 2-301 (Default stamp size)

This determines the size of the stamp.

0: Normal (about 32 x 64 mm), 1: x 2, 2: x 4, 3: x 8

26: 2-302 (Default Stamp Density)

0: Solid fill (default), 1: Fine pattern, 2: Coarse pattern

27: 2-303 (Default Stamp Position)

0: Upper left, 1: Upper middle, 2: Upper right, 3: Center left, 4: Center,
5: Center right, 6: Lower left, 7: Lower middle, 8: Lower right,
9: Everywhere (repeated)

User tool 5-4 (SP 3-120 to 128) can be used to adjust the co-ordinates of types 0 to 8.

28: 2-304 to 2-306 (User Stamp Size, Density, and Position)

These settings are the same as SP 2-301 to 2-303, except that they are for the user stamp. User stamps are stored using user tool 5-8.

User tool 5-7 (SP 3-130 to 138) can be used to adjust the co-ordinates of types 0 to 8.

29: 2-308 (Date Stamp Position)

0: Upper left (horizontal), 1: Lower right (horizontal), 2: Lower left (vertical),
3: Upper right (vertical)

30: 2-309 (Page Numbering Type)

0: P1, P2, P3, . . 1: 1/5, 2/5, 3/5, . . 2: - 1 -, - 2 -, - 3 -, . . .

31: 2-310 (Default Page Number Stamping Position)

0: Upper right (horizontal), 1: Upper left (vertical), 2: Bottom middle (horizontal),
3: Center right (vertical)

Settings 0 and 1 determine the default for the ‘P1, P2’ and ‘1/5, 2/5’ types of page numbering.

Settings 2 and 3 determine the default for the ‘- 1 -, - 2 -‘ types of page numbering.

32: 2-390 (Drum Size – A3 or DLT)

This setting changes the master making area. It also affects the available range for the default image position shift (top/bottom, SP2-020-7).

A3: -15 mm to + 15 mm
DLT: -10 mm to + 10 mm

33: 2-400, 401 (Paper types for User 1 and User 2)

The user can customize two paper types (User 1 and User 2) in addition to the three usual paper types (Normal, Thick, Special).

These SP modes give the machine a rough idea of what type of paper the user is using as types User 1 and User 2.

0: This paper type is not being used at present
1: Standard, no feed (Standard paper type, non feed likely)
2: Standard, double feed (Standard paper type, double feed likely)
3: Thick, no feed (Thick paper type, non feed likely)
4: Thick, double feed (Thick paper type, double feed likely)
5: Thick, medium (Thick paper type, with intermediate chances of double and non-feed)

3. User Custom Settings

SP No.	Display	Function	Default	Setting	User Tools
3-001	Minimum Print Quantity		0	0 to 9999%	2-1
3-002	Maximum Print Quantity		9999	0 to 9999%	2-2
3-010-1	Magnification (A3 to A4)	Allows the user to change the default reproduction ratios	71	50 to 200%	3-4
3-010-2	Magnification (B4 to A4)		82	50 to 200%	3-4
3-010-3	Magnification (A3 to B4)		87	50 to 200%	3-4
3-010-4	Magnification (Margins)		93	50 to 200%	3-4
3-010-5	Magnification (Standard)		100	50 to 200%	3-4
3-010-6	Magnification (B4 to A3)		115	50 to 200%	3-4
3-010-7	Magnification (A4 to B4)		122	50 to 200%	3-4
3-010-8	Magnification (A4 toA3)		141	50 to 200%	3-4
3-020-1	T Head Energy - Standard	Thermal head energy in standard and economy modes, as percentage of full power. Also see SP 2-032.	-7	0 to -99%	-
3-020-2	T Head Energy - Economy		-25	0 to -99%	-
3-030	Auto Reset Time	Determines how long it takes for the machine to return to the defaults.	0	0, 1 to 5	1-1
3-051	Number of Skip Feeds	Determines the edge erase margins. For example, for A3 main scan, the width of the original is 297 mm, and the erase margin is set at 293. This means that only the central 293 mm will be scanned.	2	1-9	4-11
3-060-1	MarginErase A3 MainScan		293	50-297	3-9
3-060-2	MarginErase A3 SubScan		420	50-420	3-9
3-060-3	MarginErase B4/LG-L Main		253	50-257	3-9
3-060-4	MarginErase B4/LG-L Sub		360	50-364	3-9
3-060-5	MarginErase A4/LT-L Main		206	50-216	3-9
3-060-6	MarginErase A4/LT-L Sub		293	50-297	3-9
3-060-7	MarginErase A4 MainScan		293	50-297	3-9
3-060-8	MarginErase A4 SubScan		206	50-216	3-9

SP No.	Display	Function	Default	Setting	User Tools
3-060-9	MarginErase B5-L Main	Determines the edge erase margins. For example, for A3 main scan, the width of the original is 297 mm, and the erase margin is set at 293. This means that only the central 293 mm will be scanned.	178	50-182	3-9
3-060-10	MarginErase B5-L Sub		253	50-257	3-9
3-060-11	MarginErase B5 MainScan		253	50-257	3-9
3-060-12	MarginErase B5 SubScan		178	50-182	3-9
3-060-13	MarginErase A5-L Main		144	50-148	3-9
3-060-14	MarginErase A5-L Sub		206	50-210	3-9
3-060-15	MarginErase A5 MainScan		206	50-210	3-9
3-060-16	MarginErase A5 SubScan		144	50-148	3-9
3-060-17	MarginErase Card-L Main		96	50-105	3-9
3-060-18	MarginErase Card-L Sub		144	50-148	3-9
3-060-19	MarginErase Card Main		144	50-148	3-9
3-060-20	MarginErase Card Sub		96	50-105	3-9
3-060-21	MarginErase Custom Main		66	50-300	3-9
3-060-22	MarginErase Custom Sub		161	50-432	3-9
3-061-1	Set Custom Size - Main	This allows the user to input a custom size. SP3-060-21 and 22 specify edge erase margins for this original size.	70	50-300	3-9
3-061-2	Set Custom Size - Sub		165	50-432	3-9
3-070	Machine Serial Number	Do these at installation if required. The data is used in the data printout mode in the system test. (SP3-70 and -72 can be seen in SP1-41 and -50.)	0	-	-
3-071	Installation Date		0	-	-
3-072	Service Telephone Number		0	-	-
3-073	Clock		-	-	1-8
3-074	First Power On Date		-	-	-
3-090	Manual Idling Rotation	This determines the number of drum idling rotations when the user has selected Quality Start with the Quality Start key.	45	0-90	4-12

SP No.	Display	Function	Default	Setting	User Tools
3-091-1	Auto Idling 0-4h	These determine the number of drum idling rotations in Auto Quality Start mode, depending on the length of time the machine has been unused. 3-091: 15 to 28 °C 3-092: Below 15 °C 3-093: Above 28 °C	0	0-90	4-14
3-091-2	Auto Idling 4-24h		0	0-90	4-14
3-091-3	Auto Idling 24-72h		15	0-90	4-14
3-091-4	Auto Idling 72h-Over		15	0-90	4-14
3-092-1	AutoIdling 0-4h Low Temp		0	0-90	4-14
3-092-2	Auto Idling 4-24h Low		15	0-90	4-14
3-092-3	Auto Idling 24-72h Low		45	0-90	4-14
3-092-4	Auto Idling 72h-Over Low		45	0-90	4-14
3-093-1	AutoIdling 0-4h HighTemp		0	0-90	4-14
3-093-2	Auto Idling 4-24h High		0	0-90	4-14
3-093-3	Auto Idling 24-72h High		0	0-90	4-14
3-093-4	AutoIdling 72h-Over High		15	0-90	4-14
3-100 (-1 to -12)	Register Class 1-1 to 1-12	The number of students in each class. No. of grades: Up to 9 No. of classes per grade: Up to 12 No. of students per class: Program with these SP modes Defaults for each grade Classes 1 to 4: 30 Classes 5 to 12: 0	30	0-9999	3-5
3-101 (-1 to -12)	Register Class 2-1 to 2-12		0	0-9999	3-5
3-102 (-1 to -12)	Register Class 3-1 to 3-12		0	0-9999	3-5
3-103 (-1 to -12)	Register Class 4-1 to 4-12		0	0-9999	3-5
3-104 (-1 to -12)	Register Class 5-1 to 5-12		0	0-9999	3-5
3-105 (-1 to -12)	Register Class 6-1 to 6-12		0	0-9999	3-5
3-106 (-1 to -12)	Register Class 7-1 to 7-12		0	0-9999	3-5
3-107 (-1 to -12)	Register Class 8-1 to 8-12		0	0-9999	3-5
3-108 (-1 to -12)	Register Class 9-1 to 9-12		0	0-9999	3-5
3-110	Register User Code	These are for administering the user codes and the key operator code.	-	-	6-3
3-111	Change User Code		-	-	6-4
3-112	Register Key Operator		0000	0000 to 9999	6-7
3-113	Clear User Code		-	-	6-5
3-120-1	Stamp Top Rt - Side	These specify the co-ordinates of the eight possible positions for the preset stamp.	24	8 to 144	5-4
3-120-2	Stamp Top Rt - UpDown		24	8 to 104	5-4
3-121-1	Stamp Top Mdl - Side		0	-72 to 72	5-4

SP No.	Display	Function	Default	Setting	User Tools
3-121-2	Stamp Top Mdl - UpDown	These specify the co-ordinates of the eight possible positions for the preset stamp.	24	8 to 104	5-4
3-122-1	Stamp Top Lft - Side		24	8 to 144	5-4
3-122-2	Stamp Top Lft - UpDown		24	8 to 104	5-4
3-123-1	Stamp Btm Rt - Side		24	8 to 144	5-4
3-123-2	Stamp Btm Rt - UpDown		24	8 to 104	5-4
3-124-1	Stamp Btm Mdl - Side		0	-72 to 72	5-4
3-124-2	Stamp Btm Mdl - UpDown		24	8 to 104	5-4
3-125-1	Stamp Btm Lft - Side		24	8 to 144	5-4
3-125-2	Stamp Btm Lft - UpDown		24	8 to 104	5-4
3-126-1	Stamp Rt Mdl - Side		24	8 to 144	5-4
3-126-2	Stamp Rt Mdl - UpDown		0	-52 to 52	5-4
3-127-1	Stamp Center - Side		0	-72 to 72	5-4
3-127-2	Stamp Center - UpDown		0	-52 to 52	5-4
3-128-1	Stamp Lft Mdl - Side		24	8 to 144	5-4
3-128-2	Stamp Lft Mdl - UpDown		0	-52 to 52	5-4
3-130-1	UserStamp Top Rt - Side	These specify the co-ordinates of the eight possible positions for the user stamp.	24	8 to 144	5-7
3-130-2	UserStamp Top Rt - UpDn		24	8 to 104	5-7
3-131-1	U Stamp Top Mdl - Side		0	-72 to 72	5-7
3-131-2	U Stamp Top Mdl - UpDown		24	8 to 104	5-7
3-132-1	U Stamp Top Lft - Side		24	8 to 144	5-7
3-132-2	U Stamp Top Lft - UpDown		24	8 to 104	5-7
3-133-1	User Stamp Btm Rt - Side		24	8 to 144	5-7
3-133-2	User Stamp Btm Rt - UpDn		24	8 to 104	5-7
3-134-1	U Stamp Btm Mdl - Side		0	-72 to 72	5-7
3-134-2	U Stamp Btm Mdl - UpDown		24	8 to 104	5-7
3-135-1	U Stamp Btm Lft - Side		24	8 to 144	5-7
3-135-2	U Stamp Btm Lft - UpDown		24	8 to 104	5-7

SP No.	Display	Function	Default	Setting	User Tools
3-136-1	User Stamp Rt Mdl - Side	These specify the co-ordinates of the eight possible positions for the preset stamp.	24	8 to 144	5-7
3-136-2	User Stamp Rt Mdl - UpDn		0	-52 to 52	5-7
3-137-1	User Stamp Center - Side		0	-72 to 72	5-7
3-137-2	User Stamp Center - UpDn		0	-52 to 52	5-7
3-138-1	U Stamp Lft Mdl - Side		24	8 to 144	5-7
3-138-2	U Stamp Lft Mdl - UpDown		0	-52 to 52	5-7
3-140-1	Date Top Lft - Side	These specify the co-ordinates of the four possible positions for the date stamp.	20	8-40	5-11
3-140-2	Date Top Lft - UpDown		8	8-40	5-11
3-141-1	Date Btm Rt - Side		20	8-40	5-11
3-141-2	Date Btm Rt - UpDown		8	8-40	5-11
3-142-1	Date Btm Lft - Side		12	8-40	5-11
3-142-2	Date Btm Lft - UpDown		20	8-40	5-11
3-143-1	Date Top Rt - Side		8	8-40	5-11
3-143-2	Date Top Rt - UpDown		20	8-40	5-11
3-150-1	Page Top Rt - Side	These specify the co-ordinates of the four possible positions for the page number stamp.	12	8-40	5-14
3-150-2	Page Top Rt - UpDown		8	8-40	5-14
3-151-1	Page Top Lft - Side		12	8-40	5-14
3-151-2	Page Top Lft - UpDown		12	8-40	5-14
3-152-1	Page Btm Mdl - Side		0	0	5-14
3-152-2	Page Btm Mdl - UpDown		8	8-40	5-14
3-153-1	Page Mdl Rt - Side		8	8-40	5-14
3-153-2	Page Mdl Rt - UpDown		0	0	5-14
3-161	Num of Master Eject Trial	This specifies the number of master eject attempts before an error is indicated.	1	1 to 3	-

4. Input Test Mode

SP No.	Display
4-020	Scanner HP Sensor
4-021-1	Original Length SN 0
4-021-2	Original Length SN 1
4-021-3	Original Width SN 2
4-021-4	Original Width SN 3
4-021-5	Original Length SN 4
4-021-6	Original Length SN 5
4-022	Platen Cover Sensor
4-040	Master Unit Set Sensor
4-041	Cutter HP Sensor
4-042	Master Set Sensor
4-043	Master End Sensor
4-044	Master Edge Sensor
4-046	Platen Release Sensor
4-060	Eject Box Set Sensor
4-061	Paper Eject Sensor
4-062	Pressure Plate HP Sensor
4-063	Pressure Plate Limit SN
4-080	Paper Table Lowering SW
4-081	Paper End Sensor
4-082	Table Lower Limit Sensor
4-083	Paper Table Height SN
4-084	Paper Registration SN
4-085	Paper Feed Timing Sensor
4-086-1	Paper Feed Pressure 0
4-086-2	Paper Feed Pressure 1
4-086-3	Paper Feed Pressure 2
4-086-4	Paper Feed Pressure 3
4-087-1	Separation Pressure 0
4-087-2	Separation Pressure 1
4-087-3	Separation Pressure 2
4-087-4	Separation Pressure 3
4-088	Paper Table Set Sensor
4-089	Paper Feed Start Sensor
4-090-1	Paper Width Detection 0
4-090-2	Paper Width Detection 1
4-090-3	Paper Width Detection 2
4-090-4	Paper Width Detection 3
4-090-5	Paper Width Detection 4
4-090-6	Paper Width Detection 5
4-091	Paper Length Sensor
4-100	Paper Exit Sensor
4-101-1	Wing Upper Position SN

SP No.	Display
4-101-2	Wing Lower Position SN
4-120	1st Drum Position Sensor
4-121	2nd Drum Position Sensor
4-122-1	Drum Type Check 0
4-122-2	Drum Type Check 1
4-123	Ink Pump Sensor
4-124	Ink Cartridge Set Sensor
4-125	Ink Detection
4-126	Drum Idling Roller HP SN
4-127-1	1st Drum Master Sensor
4-127-2	2nd Drum Master Sensor
4-128	Lower Wrapping Jam SN
4-129-1	A3 Cam Sensor
4-129-2	A4 Cam Sensor
4-131	Main Motor Lock Detect
4-140	Image Shift HP Sensor
4-141	Drum Shift HP Sensor
4-142-1	Clamp Close Position SN
4-142-2	Clamper Open Position SN
4-143	P Cylinder Feed Encoder
4-400	Front Door Open Detect
4-500	DF Installation Detect
4-501	DF Cover Open Sensor
4-502	DF Registration Sensor
4-503	DF Original Set Sensor
4-504-1	DF Original Width SN 1
4-504-2	DF Original Width SN 2
4-504-3	DF Original Width SN 3
4-504-4	DF Original Length SN 1
4-504-5	DF Original Length SN 2
4-505	DF Position Sensor
4-506	DF APS Start Sensor
4-520	Slider Upper Limit SN
4-521	Job Separator Paper SN
4-522	Slider Position Sensor
4-523	Slider HP Sensor
4-580	Key Card Detecteion
4-900	Key Counter Detection

5. Output Test Mode

SP No.	Display
5-001	All Indicators On
5-020	Xenon Lamp
5-021-1	Move Scanner - Scan
5-021-2	Move Scanner - Return
5-021-3	Move Scanner to HP
5-040	Master Feed Clutch
5-041	Master Vacuum Fan
5-042-1	Cutter Motor Forward
5-042-2	Cutter Motor Reverse
5-042-3	Move Cutter to HP
5-043-1	Platen Release Motor
5-043-2	Apply Platen Pressure
5-043-3	Release Platen Pressure
5-044	Master Duct Entrance Sol
5-045-1	Master Feed Motor
5-060-1	Pressure Plate to Limit
5-060-2	Press Plate to Eject Pos
5-060-3	Pressure Plate to HP
5-061-1	M Eject Motor Forward
5-061-2	M Eject Motor Reverse
5-080-1	Paper Table Motor Up
5-080-2	Paper Table Motor Down
5-081-1	Paper Pressure Motor Up
5-081-2	Paper Press Motor Down
5-082-1	Sep. Pressure Motor Up
5-082-2	Sep. Pressure Motor Down
5-083-1	Paper Feed Motor Slowest
5-083-2	Paper Feed Motor 30 rpm
5-083-3	Paper Feed Motor 1st
5-083-4	Paper Feed Motor 2nd
5-083-5	Paper Feed Motor 3rd
5-083-6	Paper Feed Motor 4th
5-083-7	Paper Feed Motor 5th
5-084-1	Regist Motor Slowest
5-084-2	Regist Motor 30 rpm
5-084-3	Registration Motor 1st
5-084-4	Registration Motor 2nd
5-084-5	Registration Motor 3rd
5-084-6	Registration Motor 4th
5-084-7	Registration Motor 5th
5-100-1	Wing Guide Motor Up
5-100-2	Wing Guide Motor Down
5-101	Air Knife Fan

SP No.	Display
5-102	Transport Vacuum Fan
5-120-1	Drum Rotation Slowest
5-120-2	Drum Rotation 1st Speed
5-120-3	Drum Rotation 2nd Speed
5-120-4	Drum Rotation 3rd Speed
5-120-5	Drum Rotation 4th Speed
5-120-6	Drum Rotation 5th Speed
5-121	Printing Pressure Sol.
5-122-1	Ink Pump Motor
5-123-1	Shift Pressure Cam to A3
5-123-2	Shift Pressure Cam to A4
5-124-1	Drum Idling Roller ON
5-124-2	Idling Roller Return
5-140-1	Clamper Motor - Open
5-140-2	Clamper Motor - Close
5-141-1	Image Shift Motor - □
5-141-2	Image Shift Motor - □
5-142-1	Drum Shift Motor - □
5-142-2	Drum Shift Motor - □
5-400	Print Counter Up
5-401	Master Counter Up
5-402	Thermal Head ON
5-500	DF Feed Motor
5-501	DF Feed Clutch
5-502	DF Pick-up Solenoid
5-520-1	Slider Lift Motor - Up
5-520-2	Slider Lift Motor - Down
5-521-1	Job Separator Motor Fwd.
5-521-2	Job Separator Motor Rev.
5-580-1	Count-up Key Card
5-580-2	Key Card Motor
5-900	Count-up Key Counter

6. System Adjustment

SP No.	Display	Function	Default	Settings
6-001-1	Main Scan Pos. - Platen	Side-to-side registration adjustment; see Note 1.	0	-5.0 to 5.0 mm
6-001-2	Main Scan Position - DF		0	-5.0 to 5.0 mm
6-002-1	Scan Start Pos. - Platen	Scanning start line adjustment; see Note 2.	0	-5.0 to 5.0 mm
6-002-2	Scan Start Position - DF		0	-5.0 to 5.0 mm
6-010	Master Writing Speed	See Note 3.	0	-5.0 to 5.0%
6-011-1	Scanning Speed - Platen	See Note 4.	0	-5.0 to 5.0%
6-011-2	Scanning Speed - DF		0	-5.0 to 5.0%
6-012	Master Writing Length	Do not use in the field.	0	-5.0 to 5.0 %
6-020-1	V&Thresh Master Eject SN	The use of these SP modes is explained in various parts of the Replacement and Adjustment section.	2.5	0.0 to 5.0V
6-020-2	V&Thresh DrumMaster 1 SN		2.5	0.0 to 5.0V
6-020-3	V&Thresh DrumMaster 2 SN		2.5	0.0 to 5.0V
6-020-4	V & Thresh Master End SN		0.9	0.0 to 5.0V
6-020-5	V & Thresh Paper Exit SN		2.5	0.0 to 5.0V
6-020-6	V&Thresh Master Edge SN		1.5	0.0 to 5.0V
6-032-1	SBU Auto Calibration	Refer to the Replacements and Adjustments section.	-	-
6-032-2	SBU Gain Setting	Do not adjust.	-	-
6-032-3	SBU DC Count Setting		-	-
6-032-4	SBU Reference Value		-	-
6-032-5	SBU Offset Value		-	-
6-050	LCD Contrast Adjustment	See Note 5.	6	0 to 7
6-070	Master Making Density	See Note 6.	1	0 to 2
6-082-1	MTF Filter Letter Mode	See Note 7.	0	0 to 11
6-082-2	MTF Filter Ltr/Pht Mode		5	0 to 11
6-082-3	MTF Filter Pencil Mode		6	0 to 11
6-082-4	MTF Filter Photo Mode		2	0 to 11
6-090-1	FeedPressure Std Special	See Note 8.	3	0 to 6

SP No.	Display	Function	Default	Settings
6-090-2	Freq - Special Paper	See Note 8.	5	0 to 6
6-090-3	V Freq - Special Paper		6	0 to 6
6-091-1	FeedPressure Std Nor Ppr		3	0 to 6
6-091-2	Freq - Normal Paper		5	0 to 6
6-091-3	V Freq - Normal Paper		6	0 to 6
6-092-1	FeedPressure Std Thick		5	0 to 6
6-092-2	Freq - Thick Paper		6	0 to 6
6-092-3	V Freq - Thick Paper		6	0 to 6
6-093-1	FeedPressure Std User 1		5	0 to 6
6-093-2	Freq - User 1 Paper		6	0 to 6
6-093-3	V Freq - User 1 Paper		6	0 to 6
6-094-1	FeedPressure Std User 2		4	0 to 6
6-094-2	Freq - User 2 Paper		5	0 to 6
6-094-3	V Freq - User 2 Paper		6	0 to 6
6-095-1	SepPressure Std Special		1	0 to 6
6-095-2	Freq - Special Paper		3	0 to 6
6-095-3	V Freq - Special Paper		4	0 to 6
6-096-1	SepPressure Std Nor Ppr		2	0 to 6
6-096-2	Freq - Normal Paper		4	0 to 6
6-096-3	V Freq - Normal Paper		6	0 to 6
6-097-1	SepPressure Std Thick		2	0 to 6
6-097-2	Freq - Thick Paper		3	0 to 6
6-097-3	V Freq - Thick Paper		4	0 to 6
6-098-1	SepPressure Std User 1		4	0 to 6
6-098-2	Freq - User 1 Paper		5	0 to 6
6-098-3	V Freq - User 1 Paper		6	0 to 6
6-099-1	SepPressure Std User 2		0	0 to 6
6-099-2	Freq - User 2 Paper		1	0 to 6
6-099-3	V Freq - User 2 Paper		2	0 to 6
6-100-1	Wing Angle - Special Ppr	See Note 9.	Low	High/Low
6-100-2	Wing Angle - Normal Ppr		High	High/Low
6-100-3	Wing Angle - Thick Paper		Low	High/Low

SP No.	Display	Function	Default	Settings
6-100-4	Wing Angle - User1 Paper	See Note 9.	High	High/Low
6-100-5	Wing Angle - User2 Paper		Low	High/Low
6-101-1	Paper Clamp - Spl Paper	See Note 10.	OFF	Enable/OFF
6-101-2	Paper Clamp - Nor Paper		Enable	Enable/OFF
6-101-3	Paper Clamp - Thk Paper		OFF	Enable/OFF
6-101-4	Paper Clamp - U1 Paper		Enable	Enable/OFF
6-101-5	Paper Clamp - U2 Paper		OFF	Enable/OFF
6-110-1	PaperFeed Delay - 16 rpm	Do not adjust. (Changes the feed motor on timing after the feed start timing sensor is activated.)	200	0 to 255
6-110-2	Feed Delay - 20 rpm		200	0 to 255
6-110-3	Feed Delay - 30 rpm		200	0 to 255
6-110-4	Feed Delay - 60 rpm		219	0 to 255
6-110-5	Feed Delay - 75 rpm		147	0 to 255
6-110-6	Feed Delay - 90 rpm		100	0 to 255
6-110-7	Feed Delay - 105 rpm		53	0 to 255
6-110-8	Feed Delay - 120 rpm		26	0 to 255
6-111-1	Thick Feed Delay - 16 rpm	Do not adjust. (Changes the feed motor on timing in thick and special paper modes after the feed start timing sensor is activated.)	200	0 to 255
6-111-2	Feed Delay - 20 rpm		200	0 to 255
6-111-3	Feed Delay - 30 rpm		200	0 to 255
6-111-4	Feed Delay - 60 rpm		199	0 to 255
6-111-5	Feed Delay - 75 rpm		130	0 to 255
6-111-6	Feed Delay - 90 rpm		78	0 to 255
6-111-7	Feed Delay - 105 rpm		40	0 to 255
6-111-8	Feed Delay - 120 rpm		16	0 to 255
6-112-1	Regist Delay - 16 rpm	Do not adjust. (Changes the registration motor on timing after the feed start timing sensor is activated.)	34	0 to 255
6-112-2	Regist Delay - 20 rpm		34	0 to 255
6-112-3	Regist Delay - 30 rpm		34	0 to 255
6-112-4	Regist Delay - 60 rpm		30	0 to 255
6-112-5	Regist Delay - 75 rpm		27	0 to 255
6-112-6	Regist Delay - 90 rpm		23	0 to 255
6-112-7	Regist Delay - 105 rpm		18	0 to 255
6-112-8	Regist Delay - 120 rpm		13	0 to 255
6-113-1	Thick Regist Delay - 16	Do not adjust. (Changes the registration motor on timing in thick and special paper modes after the feed start timing sensor is activated.)	43	0 to 255
6-113-2	Regist Delay - 20 rpm		43	0 to 255
6-113-3	Regist Delay - 30 rpm		43	0 to 255
6-113-4	Regist Delay - 60 rpm		40	0 to 255
6-113-5	Regist Delay - 75 rpm		35	0 to 255

SP No.	Display	Function	Default	Settings
6-113-6	Regist Delay - 90 rpm	Do not adjust. (Changes the registration motor on timing in thick and special paper modes after the feed start timing sensor is activated.)	30	0 to 255
6-113-7	Regist Delay - 105 rpm		25	0 to 255
6-113-8	Regist Delay - 120 rpm		20	0 to 255
6-114-1	A4 Regist Delay - 16 rmp	Do not adjust. (Changes the registration motor on timing in the use of the A4 drum after the feed start timing sensor is activated.)	34	0 to 255
6-114-2	Regist Delay - 20 rpm		34	0 to 255
6-114-3	Regist Delay - 30 rpm		34	0 to 255
6-114-4	Regist Delay - 60 rpm		30	0 to 255
6-114-5	Regist Delay - 75 rpm		27	0 to 255
6-114-6	Regist Delay - 90 rpm		23	0 to 255
6-114-7	Regist Delay - 105 rpm		18	0 to 255
6-114-8	Regist Delay - 120 rpm		12	0 to 255
6-115-1	A4 Thick Regist Delay 16	Do not adjust. (Changes the registration motor on timing in thick and special paper modes in combination with the use of the A4 drum after the feed start timing sensor is activated.)	43	0 to 255
6-115-2	Regist Delay - 20 rpm		43	0 to 255
6-115-3	Regist Delay - 30 rpm		43	0 to 255
6-115-4	Regist Delay - 60 rpm		40	0 to 255
6-115-5	Regist Delay - 75 rpm		35	0 to 255
6-115-6	Regist Delay - 90 rpm		30	0 to 255
6-115-7	Regist Delay - 105 rpm		25	0 to 255
6-115-8	Regist Delay - 120 rpm		20	0 to 255
6-116-1	Paper Clamp Timing Pulse	See Replacements and Adjustments – Paper Feed Length Adjustment for how to use.	143	0 to 255
6-116-2	Regist Timing Pulse	Do not adjust.	113	0 to 255
6-116-3	Feed Stop Timing Pulse	See Replacements and Adjustments – Paper Feed Length Adjustment for how to use.	25	0 to 255
6-116-4	Regist Speed Ctl Pulse	Do not adjust.	20	0 to 255
6-116-5	PaperClamp - Thick Paper	See Replacements and Adjustments – Paper Feed Length adjustment for how to use.	150	0 to 255
6-116-6	Regist - Thick Paper	Do not adjust.	213	0 to 255
6-116-7	Paper Clamp Pls - A4 Cam	Do not adjust.	143	0 to 255
6-116-8	Not used		-	-
6-117-1	Skip Regist Delay 16 rpm	Do not adjust.	34	0 to 255

SP No.	Display	Function	Default	Settings
6-117-2	Regist Delay - 20 rpm	Do not adjust.	34	0 to 255
6-117-3	Regist Delay - 30 rpm		34	0 to 255
6-117-4	Regist Delay - 60 rpm		30	0 to 255
6-117-5	Regist Delay - 75 rpm		27	0 to 255
6-117-6	Regist Delay - 90 rpm		23	0 to 255
6-117-7	Regist Delay - 105 rpm		18	0 to 255
6-117-8	Regist Delay - 120 rpm		12	0 to 255
6-118-1	A4 Skip Regist Delay 16 rpm	Do not adjust.	34	0 to 255
6-118-2	Regist Delay - 20 rpm		34	0 to 255
6-118-3	Regist Delay - 30 rpm		34	0 to 255
6-118-4	Regist Delay - 60 rpm		30	0 to 255
6-118-5	Regist Delay - 75 rpm		27	0 to 255
6-118-6	Regist Delay - 90 rpm		23	0 to 255
6-118-7	Regist Delay - 105 rpm		18	0 to 255
6-118-8	Regist Delay - 120 rpm		12	0 to 255
6-130	Drum Master Clamp Regist	See Note 11.	0	-10.0 to 10.0mm

Notes

1: 6-001 (Main scan position)

Inputting a positive number moves the image away from the operation side of the machine. Use the point (**.**) key to switch between + and –.

2: 6-002 (Scan start position)

Inputting a positive number moves the image away from the leading edge of the printer paper. Use the point (**.**) key to switch between + and –.

3: 6-010 (Master writing speed)

This changes the master feed motor speed.

Inputting a positive value stretches the image on the master. Inputting a negative value shrinks it.

Normally, do not use this SP mode to adjust the vertical magnification. Use it only if the vertical magnification is not satisfactory by adjusting Scanning Speed (SP6-011).

4: 6-011 (Scanning speed)

Inputting a positive value stretches the image on the master. Inputting a negative value shrinks it.

5: 6-050 (Operation panel LCD contrast)

0: Palest, 7: Darkest

6: 6-070 (Master making density)

0: Pale, 1: Normal, 2: Dark

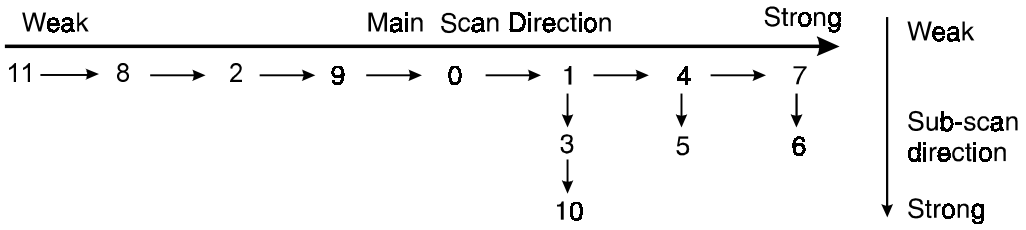
The default is 1: Normal. Changing this moves the user's image density settings up or down one notch.

7: 6-082 (MTF filters)

A stronger filter leads to a sharper image, but moiré can become more apparent.

Refer to the following diagram for the relationship between this SP mode and filter strength (the relationship is not linear). Do not use a value of 1; this is for designer's tests only.

- MTF Filter -



Note: The value is the filter number

C229D505.WMF

8: 6-90 to 99 (Paper feed and separation pressures for different paper types)

These SP modes determine the paper feed and separation pressures that are automatically applied during paper feed. The user adjusts these pressures by selecting a paper type (normal, thick, special, user 1, user 2), and then by selecting how often non-feeds and double feeds are occurring.

The user customizes the user 1 and user 2 types by selecting from 5 choices. These choices can be seen in the description for SP 2-400 and 2-401. Each of these 5 choices has a set of feed and separation pressures (refer to Detailed Section Descriptions – Paper Feed).

6-090: Special paper, feed pressure
6-091: Normal paper, feed pressure
6-092: Thick paper, feed pressure
6-093: User 1 paper, feed pressure
6-094: User 2 paper, feed pressure
6-095: Special paper, separation pressure
6-096: Normal paper, separation pressure
6-097: Thick paper, separation pressure
6-098: User 1 paper, separation pressure
6-099: User 2 paper, separation pressure

The settings for user 1 and user 2 depends on the type of paper that the user has set these up for (see SP 2-400 and 2-401).

9: 6-100 (Paper delivery table wing angle)

The machine lifts or lowers the wings depending on the paper type selected by the user (standard, special, thick, user 1, user 2).

The settings for user 1 and user 2 depends on the type of paper that the user has set these up for (see SP 2-400 and 2-401).

10: 6-101 (Paper clamping)

Whether the machine clamps the paper or not depends on the paper type selected by the user (standard, special, thick, user 1, user 2).

The settings for user 1 and user 2 depends on the type of paper that the user has set these up for (see SP 2-400 and 2-401).

11: 6-130 (Drum master clamper registration)

This determines how far after the leading edge the master is clamped.

A larger value clamps the master further away from the leading edge, and moves the image closer to the leading edge of the paper.

Do not use this SP to adjust leading edge registration. Use SP6-2 for that.

7. Memory Data Clear

SP No.	Display	User Tools
7-001	Clear Factory Settings (See "4.5.3 Clearing the Factory Settings" section.)	-
7-010	Clear Jam/Error Logging	-
7-011	Clear Resettable Counter	1-3
7-012	Clear Total Counter	-
7-020-1	Clear U-Counter: Code 1	6-2
7-020-2	Clear U-Counter: Code 2	6-2
7-020-3	Clear U-Counter: Code 3	6-2
7-020-4	Clear U-Counter: Code 4	6-2
7-020-5	Clear U-Counter: Code 5	6-2
7-020-6	Clear U-Counter: Code 6	6-2
7-020-7	Clear U-Counter: Code 7	6-2
7-020-8	Clear U-Counter: Code 8	6-2
7-020-9	Clear U-Counter: Code 9	6-2
7-020-10	Clear U-Counter: Code 10	6-2
7-020-11	Clear U-Counter: Code 11	6-2
7-020-12	Clear U-Counter: Code 12	6-2
7-020-13	Clear U-Counter: Code 13	6-2
7-020-14	Clear U-Counter: Code 14	6-2
7-020-15	Clear U-Counter: Code 15	6-2
7-020-16	Clear U-Counter: Code 16	6-2
7-020-17	Clear U-Counter: Code 17	6-2
7-020-18	Clear U-Counter: Code 18	6-2
7-020-19	Clear U-Counter: Code 19	6-2
7-020-20	Clear U-Counter: Code 20	6-2
7-021	Clear All User Counters	6-2
7-022	Clear User Code	-
7-023	Clear Key Operator Code	-
7-050	Clear User Program	-
7-051	Clear User Custom Default	-
7-052	Reset Make-up Pattern	-
7-062	Reset MTF Filter (SP6-82)	-
7-070	Reset Feed Pressure (SP6-90, 91, 92, 93, 94)	-
7-071	Reset Sep. Pressure (SP6-95, 96, 97, 98, 99)	-
7-072	Reset Wing Guide Angle (SP6-100)	-
7-073	Reset Paper Clamping Data (SP6-101)	-
7-074	Reset Feed Control Data (SP6-111, 112, 113, 114, 115, 117, 118)	-
7-075	Reset Feed Control Pulse Data (SP6-116)	-

8. System Test

SP No.	Display (Comments)
8-010-1	Scanner Free Run M
8-010-2	Magnification at FreeRun
8-011-1	ADF Free Run Mode
8-011-2	Mag. at ADF Free Run
8-020	Load Program (See "4.5.4 Load Program" section.)
8-030	APS Sensor Check Mode
8-040	TH Test Pattern Select (Patterns 0 to 9, 0: No pattern)
8-050-1	Make Master with Pattern
8-050-2	Make-up Pattern Number
8-070-1	Logging Data Printout (Needs the optional memory board)
8-070-2	User Code Counters Only (Needs the optional memory board)
8-070-3	Jam & SC Counters Only (Needs the optional memory board)
8-070-4	Jams/Errors Details (Needs the optional memory board)
8-071	Basic Settings Printout (Needs the optional memory board)
8-072-1	UserCustomSettings Print, excludes class mode (Needs the optional memory board)
8-072-2	Class Mode Settings (Needs the optional memory board)
8-073-1	Input Test Item Printout (Needs the optional memory board)
8-073-2	OutputTest Item Printout (Needs the optional memory board)
8-074-1	System Adjustment Print (Needs the optional memory board)
8-074-2	Paper Feed Adjustments
8-080	Not used
8-100-1	Register User Stamp A (UP Mode 5-8)
8-100-2	Register User Stamp B (UP Mode 5-8)
8-100-3	Register User Stamp C (UP Mode 5-8)
8-100-4	Register User Stamp D (UP Mode 5-8)
8-110	Register Makeup Pattern (UP Mode 5-15)

4.5.3 CLEARING THE FACTORY SETTINGS (SP7-1)

⚠CAUTION

Performing "Clear factory settings" (SP7-1) resets a part of the settings stored in the RAM to their default settings. Normally, this SP mode should not be used. This procedure is required only after replacing the RAM on the MPU or when the machine malfunctions due to a damaged RAM.

The following data is not cleared even after performing "Clear factory settings" (SP7-1).

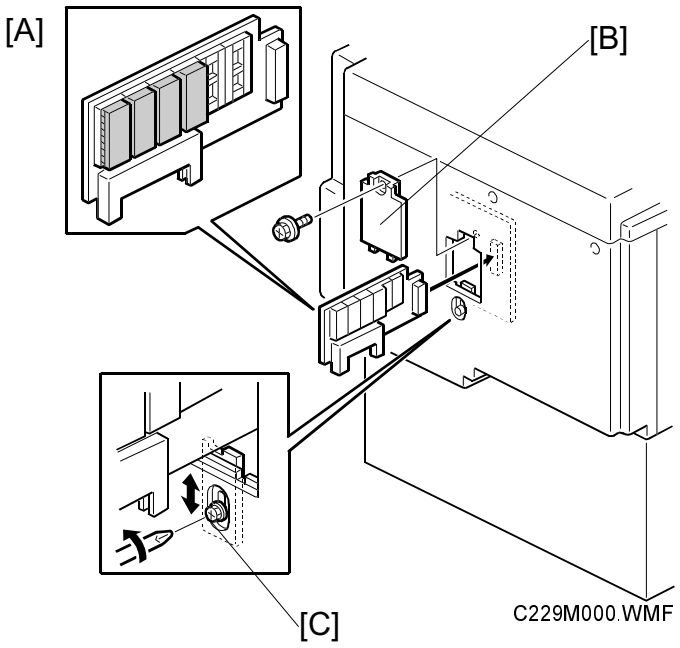
- SP2-10: Sizes in Metric or Inch
- SP2-11: Select Language Type
- SP2-380: Japanese Display Type (Do not use.)
- SP2-390: A3/DLT Drum Selection
- SP2-421: Type of Thermal Head (Do not use.)
- SP3-70: Machine Serial Number
- SP3-73: Clock
- SP6- All : System Adjustment

1. Save the data SP mode in order to restore it later.
   NOTE: If possible, print out all system parameter lists using SP8-70, 71, 72, 73, and 74. The optional memory board is required to use the data printout function.
2. Enter SP7-1.
3. Press the Enter (#) key while holding the “0” key.
   NOTE: When the sequence is successful, “**Cleared**” is displayed.

4.5.4 LOAD PROGRAM (SP8-20)

The software in the flash ROM on the MPU can be upgraded using the ROM board (a special tool), as follows.

NOTE: The ROM board is available as a service part. The part number is #A193 9351.



1. Before downloading new software, check the current version with SP1-42.
2. Turn off the main switch and disconnect the power plug.
3. Mount the U1 to U4 ROMs in the correct sockets on the ROM board [A] as shown above.
4. Remove the cover [B].
5. Plug the ROM board into the connector on the MPU.
6. Loosen the screw [C] to adjust the ROM board stand position. Then, retighten the screw.
7. Connect the power plug and turn on the main switch.
8. Access SP8-20 and press the **OK** key. Press the **Enter (#)** key to start downloading (the LCD displays '**Processing**').
9. After completing the download (the LCD displays '**Completed**'), check the updated ROM version with SP1-42.
10. Leave the SP mode and turn off the main switch, then remove the ROM board.

4.5.5 USER TOOLS

Some items in the SP mode can be accessed by users with the User Tools. The User Tools key on the operation panel accesses these.

The following table shows all the user tools.

User Tools Table

No.	Display	Equivalent SP No.
1-1	Auto Reset Time	3-030
1-2	R. Counter Display	1-001-2, 1-002-2
1-3	Reset R. Counter	7-011
1-4	Set User Code	2-100
1-5	Key Card Setting	2-220
1-6	Sizes in Metric or Inch	2-010
1-7	Select Language Type	2-011
1-8	Time Setting	3-073
1-9	Auto On-line	2-410
1-10	Data Print	8-070-2, 8-072-2
2-1	Minimum Print Quantity	3-001
2-2	Maximum Print Quantity	3-002
2-3	Copy Count Display	2-230
2-5	Panel Beeper	2-030
2-6	LCD Contrast Adjustment	6-050
3-1	Default Paper Type	2-020-3
3-2	Default Master Density	2-020-4
3-3	Default Original Mode	2-020-1
3-4	Magnification Ratio Settings	3-010-1 to -8
3-5	Class Mode Settings	3-100
3-5	Class Entry Number Settings	3-100 to 3-108
3-6	Default Photo/Lightness	2-020-9
3-7	Default Photo/Screen	2-020-10
3-8	Default Tint Mode	2-020-2
3-9	Margin Erase Area Settings	3-060-1 to -22
3-9	Custom Margin Erase Area Settings	3-061-1 to -2
3-10	Default On-line Paper Size	2-020-11
4-1	Default Auto Cycle Mode	2-020-6
4-2	Class Entry Per Orig.	2-241
4-3	Paper Width Detection	2-042-1
4-4	ADF Orig. Size Detect	2-046-2
4-5	Platen Orig. Size Detect	2-046-1
4-6	Background ON/OFF	2-031
4-7	Long Paper Mode	2-060
4-8	Auto Combine Originals	2-070
4-9	Combine Orig. Sep. Line	2-250
4-10	Default Auto Cycle Mode	2-260

No.	Display	Equivalent SP No.
4-11	Skip Feed Mode Display	2-320
4-11	Number of Skip Feeds	3-051
4-12	Manual Idling Rotation	3-090
4-13	Auto Quality Start	2-110
4-14	Quality Start Mode Settings	3-091 to 3-093
4-15	Exit Wing Position	2-120
4-16	Print Restart in Class	2-270
4-17	Job Sep. At Class Mode	2-271
4-18	Ink/Master Left	2-210
4-19	User1 Paper Type	2-400
4-19	User2 Paper Type	2-401
4-20	Auto Image Rotation	2-150
4-21	Master Cut Length	2-170
5-1	Stamp Type	2-300
5-2	Default Stamp Size	2-301
5-3	Default Stamp Density	2-302
5-4	Default Stamp Position	2-303
5-4	Stamp Position Adjustments	3-120 to 3-128
5-5	User Stamp Size	2-304
5-6	User Stamp Density	2-305
5-7	Default User Stamp Position	2-306
5-7	User Stamp Position Adjustments	3-130 to 3-138
5-8	Register User Custom Stamps	8-100-1 to -4
5-9	Date Stamp Type	2-307
5-10	Default Date Stamp Position	2-308
5-11	Date Stamp Position Adjustments	3-140 to 3-143
5-12	Page Numbering Type	2-309
5-13	Default Page Stamping Positions	2-310-1 to -2
5-14	Page Stamping Position Adjustments	3-150 to 3-153
5-15	Register Makeup Pattern	8-110
6-1	Master and Print Counters for Each User Code	1-030 to 1-040
6-1	Master Counter for All User Codes	1-031-1
6-1	Print Counter for All User Codes	1-031-2
6-2	Clear Counters for Each User Code	7-020-1 to -20
6-3	Register User Code	3-110
6-4	Change User Code	3-111
6-5	Clear User Code	3-113
6-6	Key Operator Code	2-290
6-7	Register Key Operator	3-112
6-8	Restricted Access	2-291

5. PREVENTIVE MAINTENANCE

5.1 MAINTENANCE TABLE

The following items should be maintained periodically. There are two sets of intervals - one based on time and the other based on print count. For maintenance items with entries in both of them, use whichever comes first.

C: Clean, R: Replace, L: Lubricate, A: Adjust

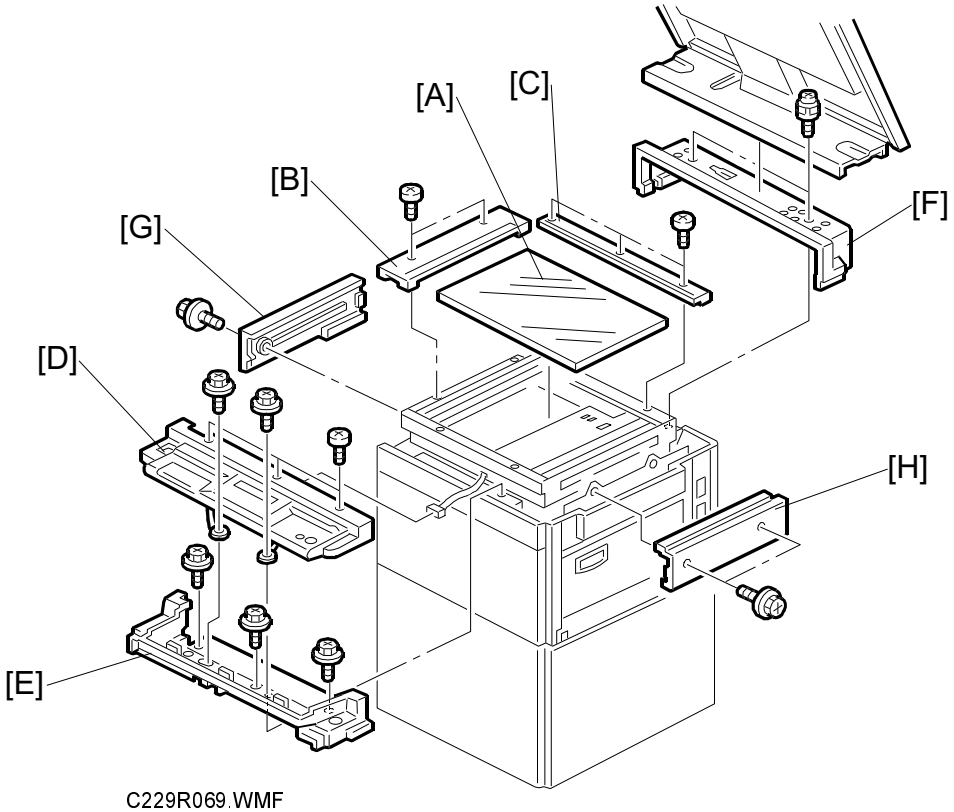
Interval / Item	Time				Print Counter					EM	NOTE
	6M	1Y	2Y	3Y	300K	600K	1M	1.2M	2M		
Scanner/Optics											
Exposure Lamp	C	C	C	C							Dry Cloth
Mirror/Reflector	C	C	C	C							Soft Cloth
Scanner Guide Rail	C	C	C	C							Dry Cloth
Platen Cover / White Plate	C	C	C	C							Damp Cloth
Exposure Glass	C	C	C	C							Dry Cloth
Master Feed											
Thermal Head										C	Alcohol
Platen Roller	C	C	C	R							Expected life is 6K masters.
Master Eject Rollers	C	C	C	C							Alcohol
Master Eject Box	C	C	C	C							Alcohol
1st and 2nd Drum Master Sensors										C	Dry Cloth
Paper Feed											
Paper Pick-up Roller	C	C	R	C				R			Damp Cloth
Paper Feed Roller	C	C	R	C				R			Damp Cloth
Paper Feed and Pick-up Roller One-way Clutches			R					R			
Friction Pad	C	C	R	C				R			Damp Cloth
Feed Roller and Transport Belt Roller Bushings		L	L	L							Motor Oil (SAE #20)
Feed Drive Gears		L	L	L							Grease (Alvania #2)
Paper Delivery Transport Belts			R					R			
Paper End Sensor	C	C	C	C							Dry Cloth

Interval / Item	Time				Print Counter					EM	NOTE
	6M	1Y	2Y	3Y	300K	600K	1M	1.2M	2M		
Registration/Feed Timing/Exit Sensors	C	C	C	C							Dry Cloth
Registration Roller	C	C	C	C							Dry Cloth
Drum and Ink Supply											
Cloth Screen			R					R			
Drum Drive Gears and Cam		L	L	L							Grease (Alvania #2)
Drum Flange Bushing		L	L	L							Motor Oil (SAE #20)
In/Outside of Drum	C	C	C	C							Alcohol
Ink Nozzle	C	C	C	C							Alcohol
Others											
Pressure Cylinder	C	C	R	C				R			Damp Cloth
Paper Clamper (on Pressure Cylinder)	C	C	R	C				R			Dry Cloth
Timing Belt Tension			A								
ADF (Option)											
DF Feed Rollers	C	C	C	C							Dry Cloth

6. REPLACEMENT AND ADJUSTMENT

6.1 EXTERIOR

6.1.1 EXPOSURE GLASS, OPERATION PANEL, AND UPPER COVERS



A: Exposure glass (First, remove the left scale [B] and upper scale [C].)

D: Operation panel

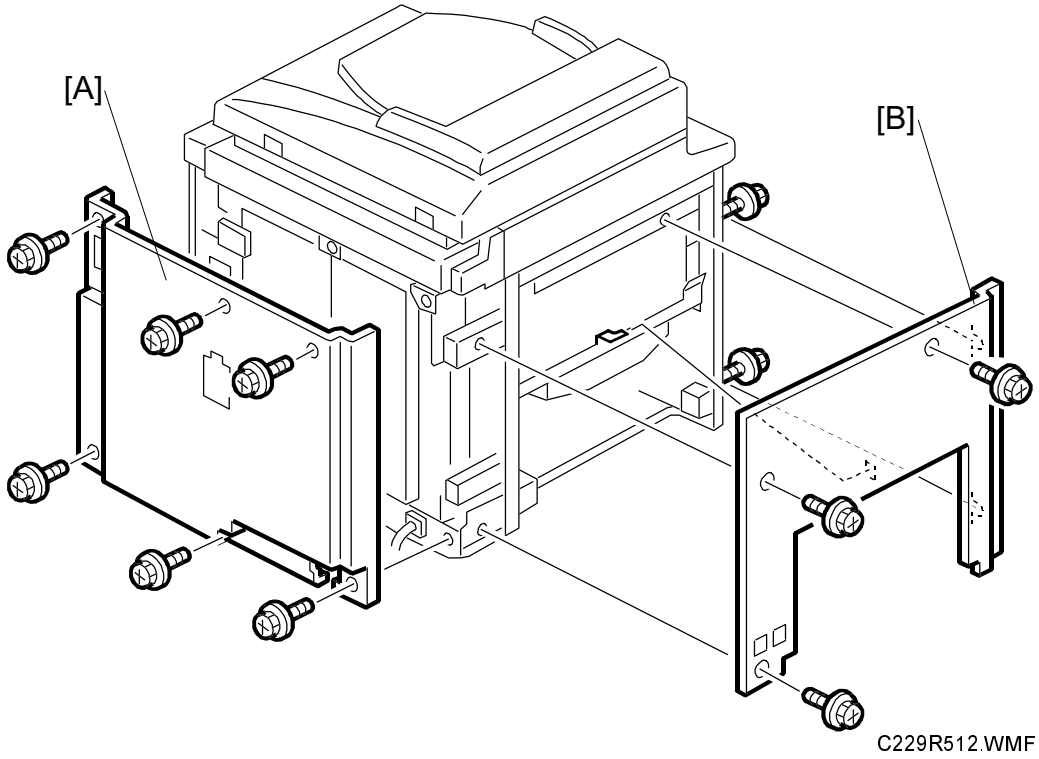
E: Lower operation panel cover

F: Rear upper cover

G: Left scanner cover

H. Right scanner cover

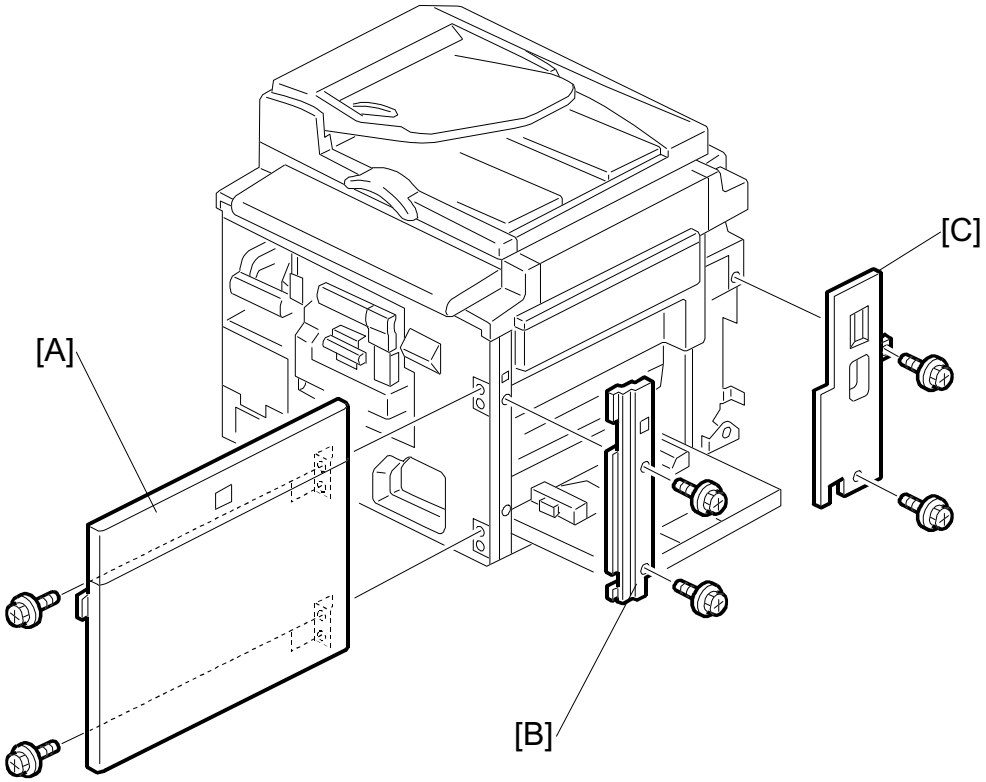
6.1.2 REAR AND LEFT COVERS



A: Rear cover

B: Left cover

6.1.3 FRONT DOOR, AND RIGHT FRONT AND RIGHT REAR COVERS



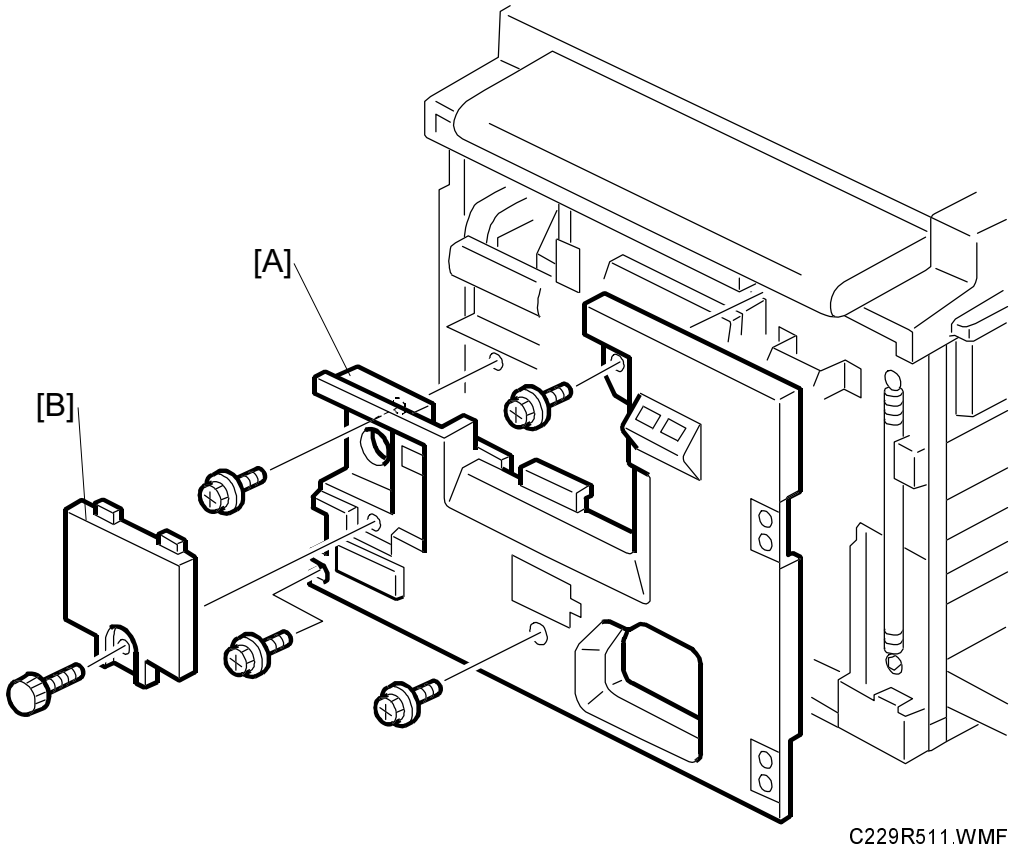
C229R510.WMF

A: Front door

B: Right front cover

C: Right rear cover

6.1.4 INNER COVER AND KNOB COVER



A: Inner cover

B: Knob cover

6.2 COPY IMAGE ADJUSTMENT

6.2.1 LEADING EDGE REGISTRATION ADJUSTMENT

PURPOSE: To adjust the leading edge registration on prints by changing the image scanning start positions in platen and ADF modes.

ADJUSTMENT STANDARD:

Within 0 ± 2.0 mm (in platen mode)

Within 0 ± 2.5 mm (in ADF mode)

CAUTION: This adjustment is required every time the MPU has been replaced.

1. Turn on the main switch, and make a copy in platen mode.

   NOTE: The image position on the trial print that is automatically made after making a master tends to be inconstant. Do not use the trial print to check the copy image.

2. Measure the difference between the leading edge registration of the original and the print. If the registration does not meet specifications, go to the next step.
3. Access SP6-2-1 (Scan Start Position Adjustment - Platen Mode).
4. Adjust the gap.
5. Exit the SP mode and make a copy.
6. Re-measure the leading edge registration to ensure it is within specifications. If the registration meets specifications, go to the next step.
7. Make a copy in ADF mode and repeat the same steps using SP6-2-2 (Scan Start Position - DF Mode). The specification in ADF mode is 0 ± 2.5 mm.

NOTE: The master clamping position is adjustable using SP6-130 (Drum Master Clamp Registration). Changing the clamping position with this SP also adjusts the leading edge registration. Normally, do not use this SP mode for adjusting the leading edge registration.

6.2.2 SIDE-TO-SIDE REGISTRATION ADJUSTMENT

PURPOSE: To adjust the side-to-side image position on prints by changing the main-scan positions in platen and ADF modes.

ADJUSTMENT STANDARD:

Within 0 ± 2.0 mm (in platen mode)

Within 0 ± 2.5 mm (in ADF mode)

CAUTION: This adjustment is required every time the MPU has been replaced.

1. Turn on the main switch, and make a copy in platen mode.

   NOTE: The image position on the trial print that is automatically made after making a master tends to be inconstant. Do not use the trial print to check the copy image.

2. Measure the difference between the side-to-side edge registration of the original and the print. If the registration does not meet specifications, go to the next step.
3. Access SP6-1-1 (Main-scan Position - Platen Mode).
4. Adjust the gap.
5. Exit the SP mode and make a copy.
6. Re-measure the side-to-side registration to ensure it is within specifications. If the registration meets specifications, go to the next step.
7. Make a copy in ADF mode and repeat the same steps using SP6-1-2 (Main-scan Position - DF Mode). The specification in ADF mode is 0 ± 2.5 mm.

6.2.3 VERTICAL MAGNIFICATION ADJUSTMENT

PURPOSE: To adjust the vertical magnification to within the adjustment standard by changing the scanning speeds in platen and ADF modes.

ADJUSTMENT STANDARD:

Within 100 ± 1.0%

CAUTION: This adjustment is required every time the MPU has been replaced.

1. Turn on the main switch, and make a copy in platen mode.

   NOTE: The image position on the trial print that is automatically made after making a master tends to be inconstant. Do not use the trial print to check the copy image.
2. Measure the difference between the magnification of the original and the print. If the vertical magnification does not meet specifications, go to the next step.
3. Access SP6-11-1 (Scanning Speed - Platen Mode).
4. Adjust the value.
5. Exit the SP mode and make a copy.
6. Check the vertical magnification again to ensure it is within specifications. If the vertical magnification meets specifications, go to the next step.
7. Make a copy in ADF mode and repeat the same steps using SP6-11-2 (Scanning Speed - DF Mode).

NOTE: The master feed speed during image writing can be adjusted with SP6-10 (Master Writing Speed). Changing the speed with this SP also adjusts the vertical magnification. Normally, do not use this SP mode for adjusting the vertical magnification.

6.3 MPU AND I/O BOARD REPLACEMENT

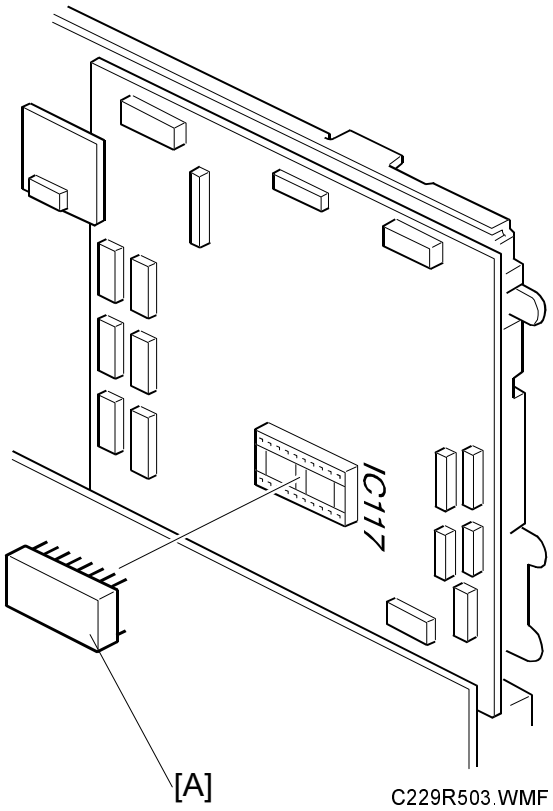
SP mode data and other adjustment data are stored in the backup RAM on the MPU. There are adjustable potentiometers on the I/O board.

Therefore, once the MPU and/or I/O boards are replaced, the following adjustments are needed.

- When the MPU is replaced -

- The SP mode data returns to the default. Save the data SP mode in order to restore it later. If possible, print out all system parameter lists using SP8-70, 71, 72, 73, and 74. (The optional memory board is required to use the data printout function.)
- Carry out all copy image adjustments. (See "6.2 Copy Image Adjustment".)
- Sensor board unit calibration. (See "6.5.8 Sensor Board Unit Calibration".)
- Master end sensor adjustment. (See "6.7.7 Master End Sensor Adjustment".)

NOTE: If you use the backup RAM [A] (IC117) from the old MPU on the new one, all data, including data in the SP modes, will be restored. You do not have to do the above procedures. (The battery inside the RAM preserves the data even if the RAM is removed from the MPU.)



- When the I/O board is replaced -

- Carry out the adjustments for the 1st drum master, 2nd drum master, master eject, and master edge sensors. (When both MPU and I/O board are replaced, carry out the master end sensor adjustment, also.)

6.4 MPU AND PSU OPENING PROCEDURES

Opening the MPU

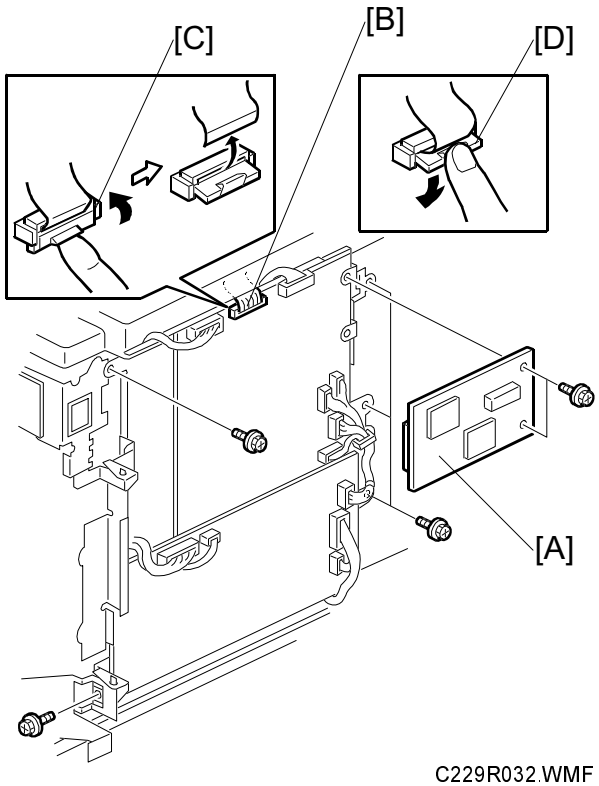
First, remove the rear exterior cover.

A: Memory board (If installed, as this is an option.)

B: Flat cable

NOTE: Gently pull out the lever [C] to release the flat cable, as shown. It can easily be damaged. Also, when reconnecting it, carefully push it back as shown [D].

Then, remove 7 screws securing the MPU bracket to flip over the MPU.

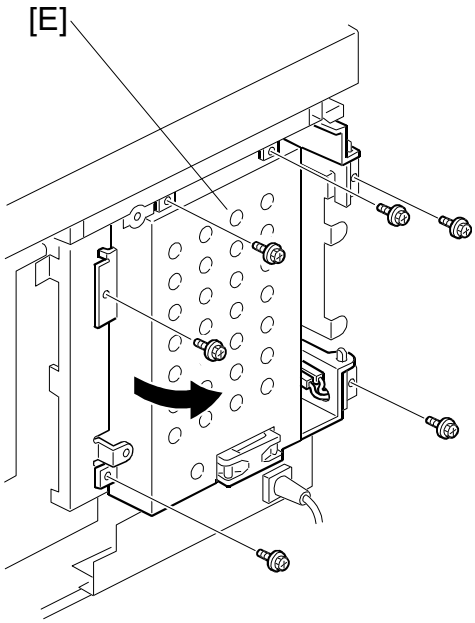


C229R032.WMF

Opening the PSU

First, remove the rear exterior cover.

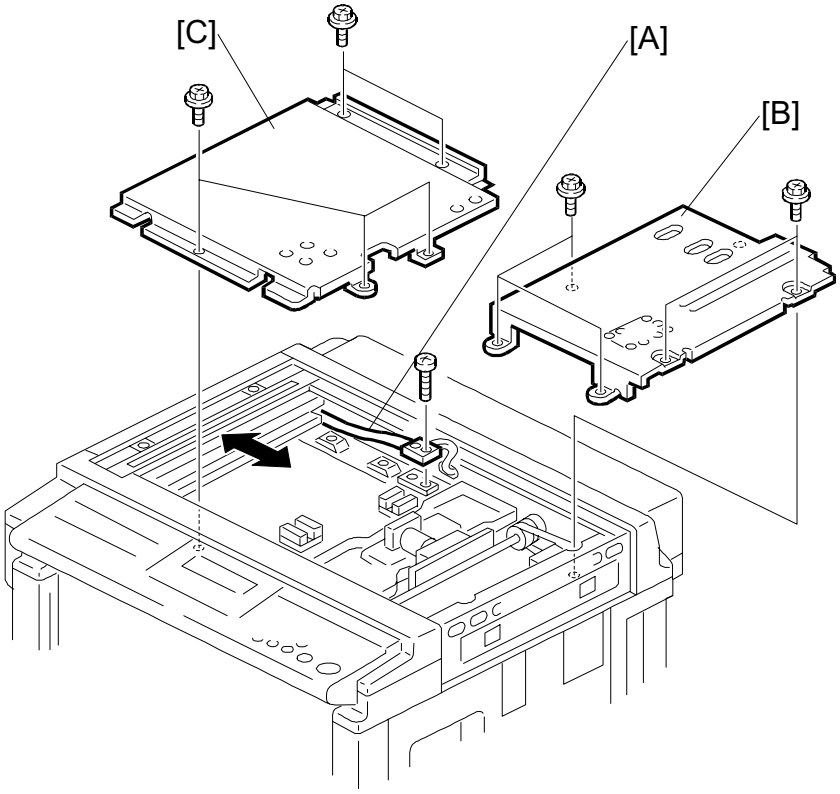
Then, remove 6 screws to flip over the PSU [E].



C229R095.WMF

6.5 SCANNER UNIT

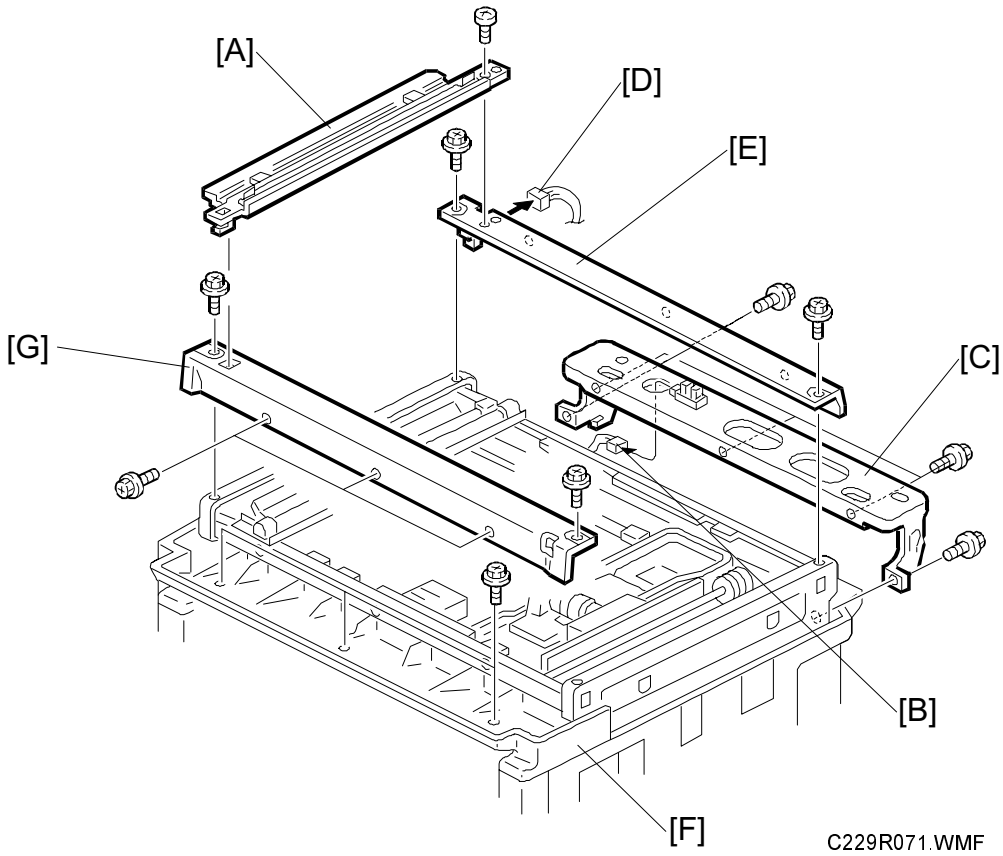
6.5.1 LENS COVER



C229R070.WMF

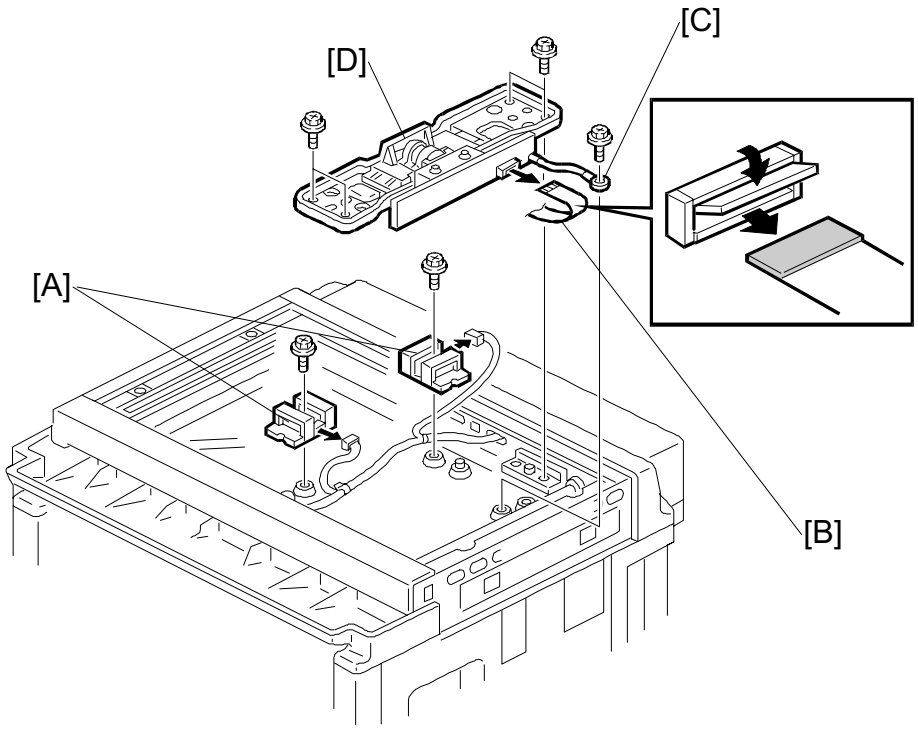
1. Remove the scales and exposure glass. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Remove the flat cable [A] (1 screw).
3. Remove the right lens cover [B] (6 screws) and left lens cover [C] (5 screws).

6.5.2 SCANNER FRAME



1. Remove the platen cover (ADF).
2. Remove all parts indicated in 6.1.1 Exposure Glass, Operation Panel, and Upper Covers section.
3. Remove the exposure glass bracket [A] (1 screw).
4. Disconnect the platen cover sensor [B] and remove the lower rear scanner frame [C] (5 screws).
5. Disconnect the scanner H.P. sensor [D] and remove the upper rear scanner frame [E] (2 screws).
6. Remove the lower operation panel [F] (3 screws).
7. Remove the front scanner frame [G] (5 screws).

6.5.3 ORIGINAL SIZE SENSOR AND LENS BLOCK/SBU ASSEMBLY



C229R072.WMF

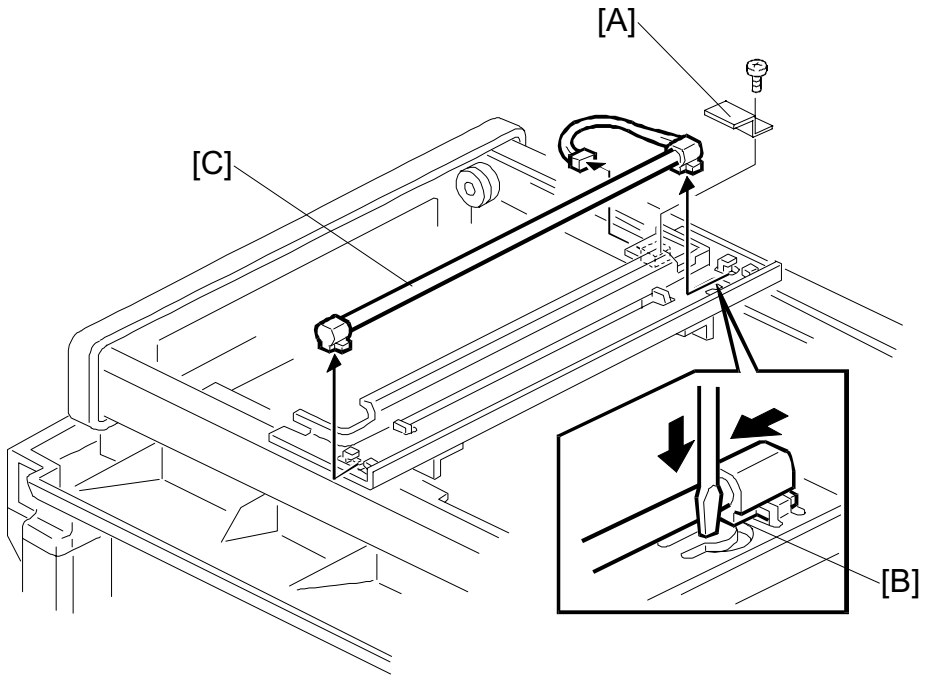
Original Size Sensors

1. Remove the exposure glass. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Remove the lens covers. (See 6.5.1 Lens Cover.)
3. Change the original size sensors [A]: two for 110/120 V machines and three for 220/240 V machines (2 screws each).

Lens Block/SBU Assembly

1. Remove the exposure glass and operation panel. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Remove the lens covers. (See 6.5.1 Lens Cover.)
3. Disconnect the flexible cable [B].
4. Remove the grounding wire [C] (1 screw).
5. Remove the lens block [D] (4 screws).

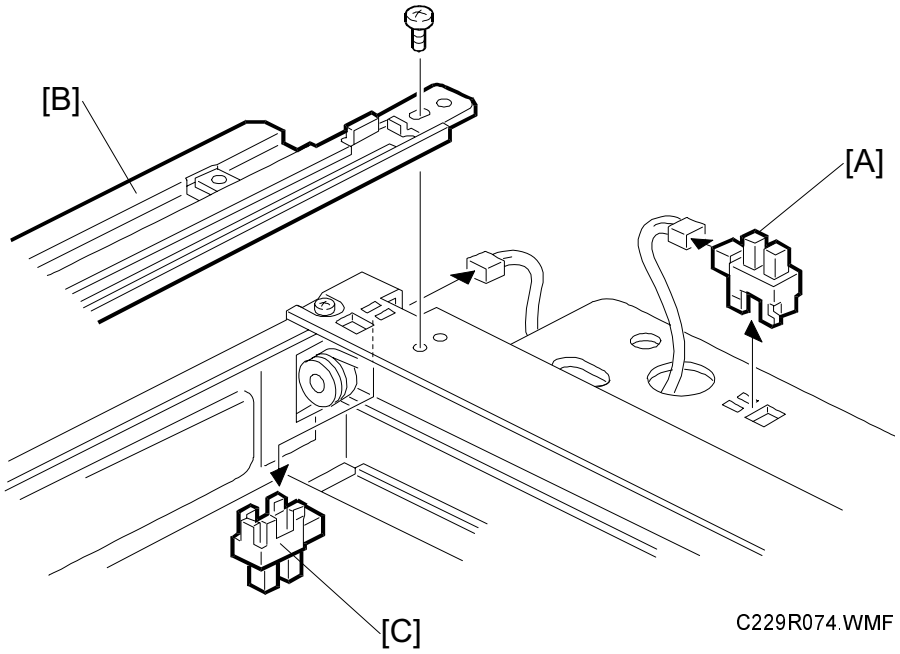
6.5.4 XENON LAMP



C229R073.WMF

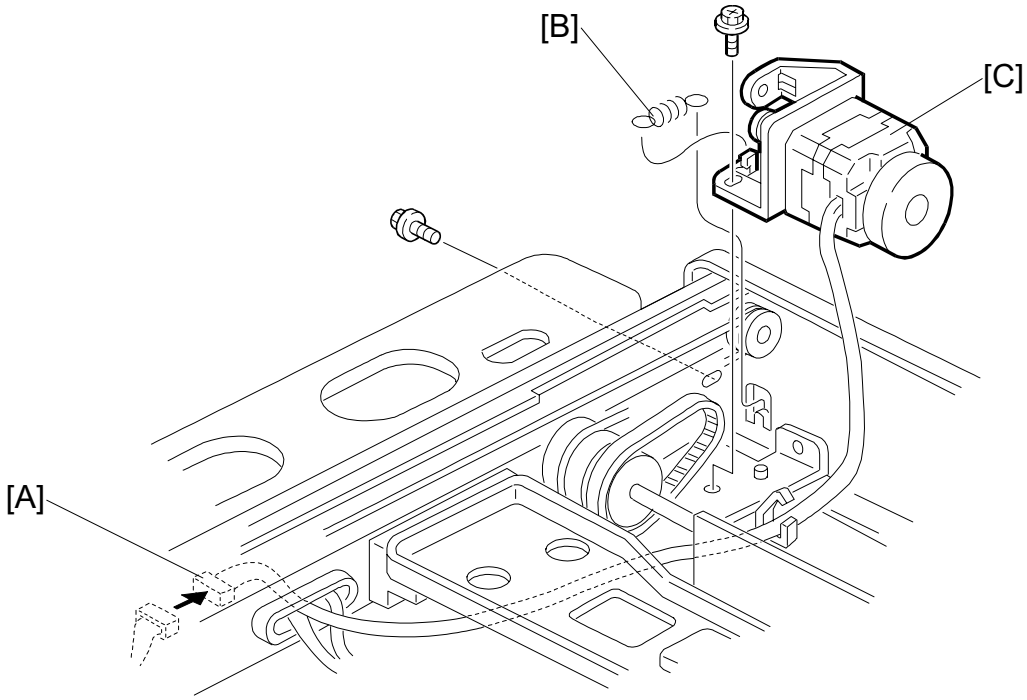
1. Remove the exposure glass and operation panel. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Remove the scanner frames. (See 6.5.2 Scanner Frame.)
3. Remove the connector cover [A] (1 screw).
4. Press the lamp holder [B] down with a screwdriver, as shown.
5. Slide the xenon lamp [C] forward and remove it (1 connector).
   NOTE: Do not touch the glass surface of the xenon lamp with your fingers.
6. After installing the new lamp, press the lamp holder up to the original position so that it can hold the lamp properly.

6.5.5 SCANNER H. P. SENSOR/PLATEN COVER SENSOR



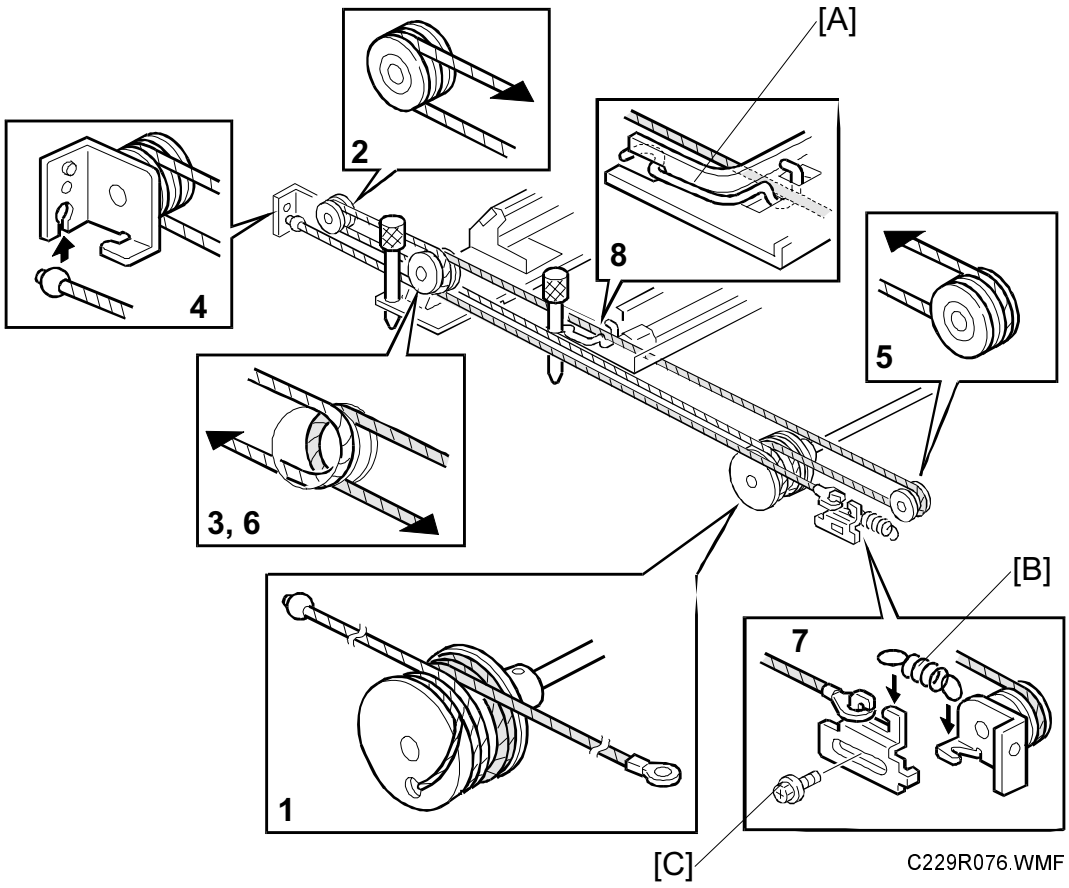
1. Remove the exposure glass and upper rear cover. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Replace the platen cover sensor [A] (1 connector).
3. Remove the scale bracket [B] (1 screw) and replace the scanner H.P. sensor [C].

6.5.6 SCANNER MOTOR

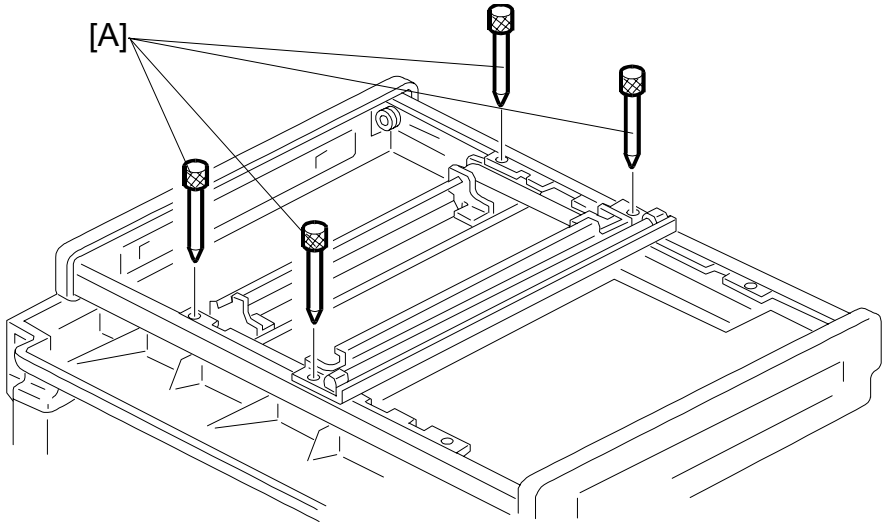


1. Remove the exposure glass and operation panel. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Remove the lens covers. (See Lens Cover.)
3. Remove the scanner frames. (See Scanner Frame.)
4. Disconnect the cable [A].
5. Remove the tension spring [B].
6. Remove the motor and bracket [C] (2 screws).
7. Secure the new motor with the tension spring.

6.5.7 SCANNER WIRE



1. Remove the exposure glass and operation panel. (See 6.1.1 Exposure Glass, Operation Panel, and Upper Covers.)
2. Remove the lens covers. (See 6.5.1 Lens Cover.)
3. Remove the scanner frames. (See 6.5.2 Scanner Frame.)
4. Remove the pin [A] securing the 1st scanner and remove the 1st scanner.
5. Remove the spring [B].
6. Loosen the screw [C] securing the wire tension bracket. Loosen the screw at the opposite side.
7. Remove the scanner wire.
8. Wind the new scanner wire on the pulley in the correct direction as shown.



C229R077.WMF

9. Wind the end of the new wire with a ball as shown by steps 2 - 4 in the illustration on the previous page.
10. Wind the end of the new wire with a ring as shown by steps 5 - 7 in the illustration on the previous page.
11. Secure the screw of the wire tension bracket, with the wire tension spring pulled as shown by step 7 in the illustration on the previous page.
12. Install the 1st scanner and adjust its position with the scanner positioning pins (P/N A0069104) [A]. Then clamp the 1st scanner with the scanner positioning pin as shown by step 8 in the illustration on the previous page.
13. Remove the positioning pins. After sliding the scanner to the left and right several times, set the scanner positioning pins to check the clamp position and wire tension bracket position again.

6.5.8 SENSOR BOARD UNIT CALIBRATION

PURPOSE: Perform the SBU auto calibration using the SP mode in the following cases:

- When the MPU is replaced
- When the standard white plate located behind the original scale is replaced.

PROCEDURE:

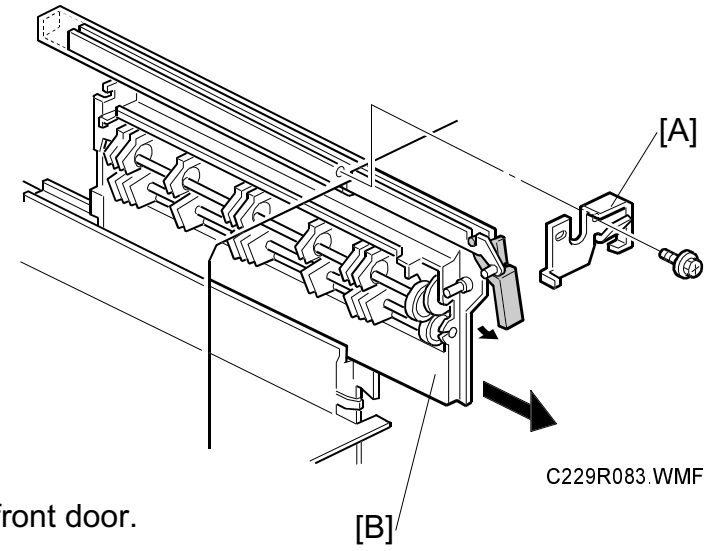
1. Place about 10 sheets of paper on the exposure glass.
2. Turn on the main switch and access the SP mode (Clear Modes ⇒ 1 ⇒ 0 ⇒ 7 ⇒ Clear/Stop).
3. Select SP6-32-1 (SBU Auto Calibration).
4. Press the Enter (#) key to start.

NOTE: When the sequence is successful, “Completed” is displayed on the display.

6.6 MASTER EJECT SECTION

6.6.1 MASTER EJECT ROLLER UNIT

Unit Removal

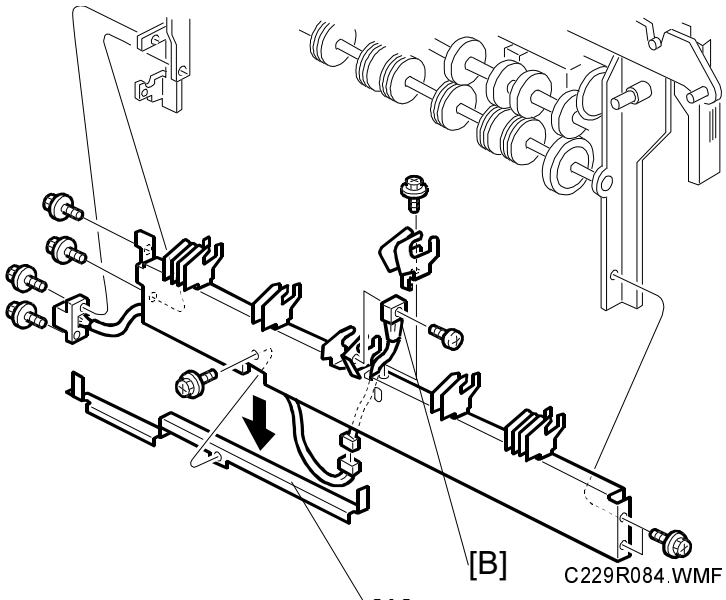


First, open the front door.

A: Supporter

B: Master eject roller unit

Master Eject Sensor



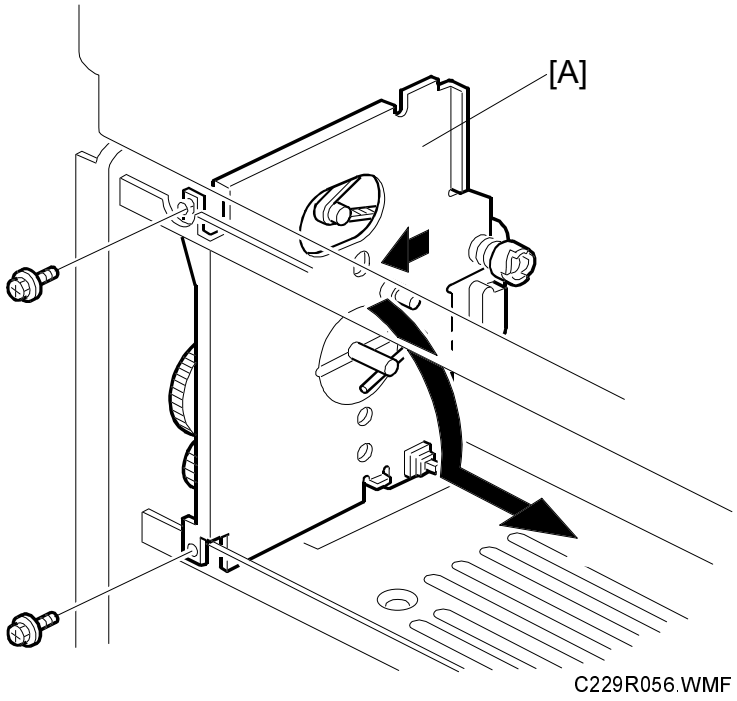
First, remove the master eject roller unit. (See the procedure above.)

A: Master eject sensor cover

B: Master eject sensor

6.6.2 MASTER EJECT DRIVE UNIT

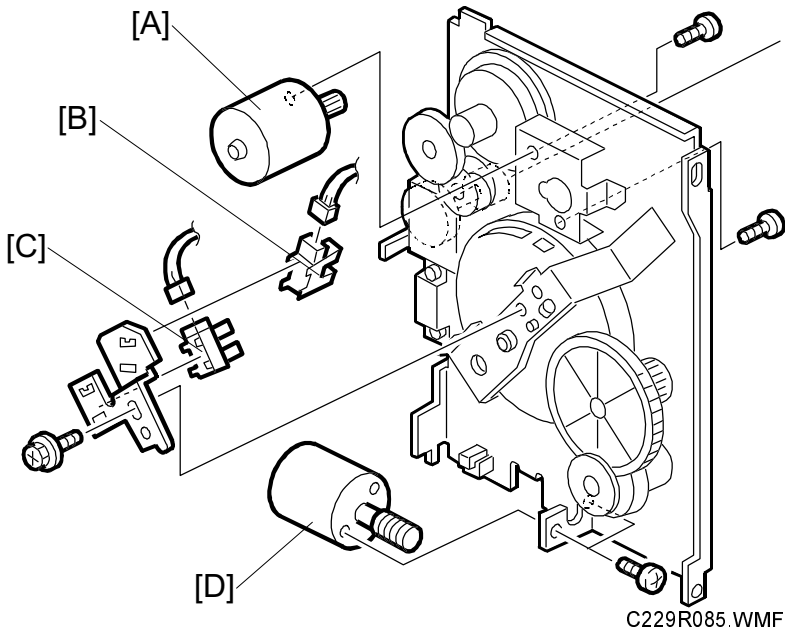
Unit Removal



1. Slide out the master eject box and the master eject drive unit.
2. Remove the left exterior cover.
3. To remove the master eject drive unit [A], slide it out in the paper delivery direction, and pull down the top of the unit towards the operation panel. (See the arrows in the illustration.)

NOTE: The master eject drive unit is connected to the cables from the sensor and the motor. Remove the master eject unit carefully.

Sensors and Motors in the Master Eject Drive Unit



First, remove the master eject drive unit.
(See the previous procedure.)

A: Master Eject Motor

B: Pressure Plate HP Sensor

C: Pressure Plate Limit Position Sensor

D: Pressure Plate Motor

6.6.3 MASTER EJECT SENSOR ADJUSTMENT

PURPOSE: To ensure that the sensor detects the ejected master properly.

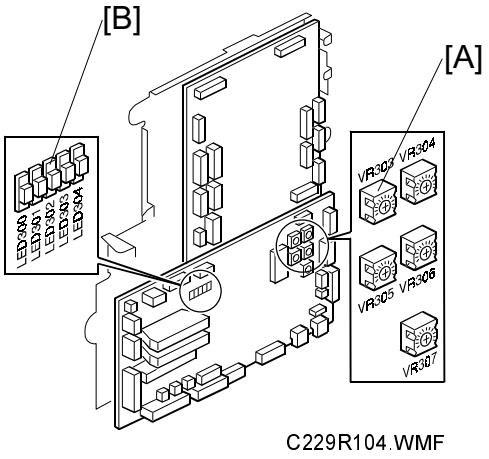
CAUTION: 1) The sensor adjustment is required in the following cases:
- When the sensor is replaced.
- When the I/O board is replaced.

2) While adjusting, make sure to attach all exterior covers to avoid external light.
3) Do not turn the VRs excessively. Turn slowly until the LED turns off.
4) If the sensor is dirty, clean or replace it.
5) For how to access SP mode, refer to the Service Program Mode section.

PROCEDURE

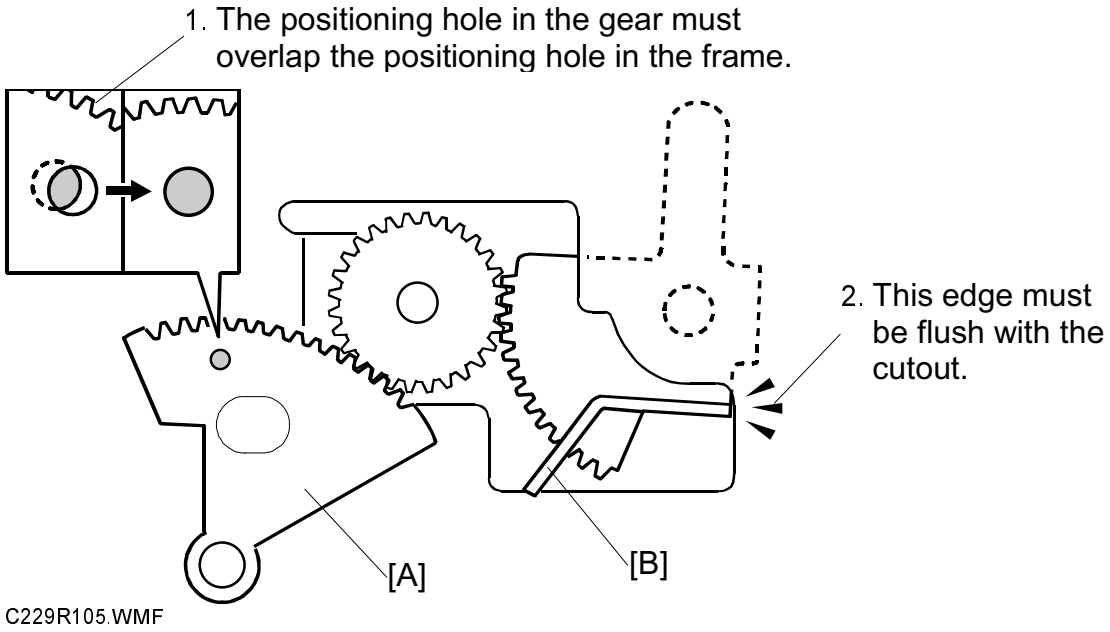
1. Turn on the main switch, then access SP6-20-1 (Sensor Voltage and Threshold Adjustment for Master Eject Sensor).

   NOTE: Make sure that the master eject box and drum are installed.
2. Remove the rear cover and access the I/O board. Turn VR303 [A] clockwise until LED302 [B] lights.
3. The sensor input voltage is displayed on the operation panel. Check that it is between 1.0 and 1.5 volts. If it is not, go back to step 2.
4. Leave the SP mode.



C229R104.WMF

6.6.4 REASSEMBLING THE MASTER PICK-UP ROLLER DRIVE GEARS


1. The positioning hole in the gear must overlap the positioning hole in the frame.
2. This edge must be flush with the cutout.
[A]
[B]
C229R105.WMF

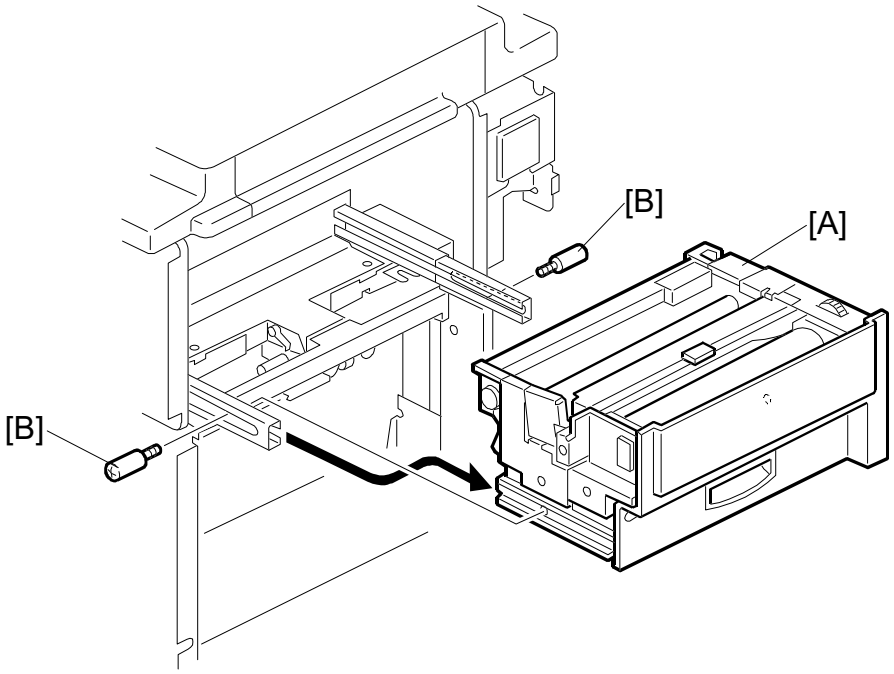
PURPOSE: When the master pick-up roller drive sector gear [A] or master eject clamper drive arm [B] have been removed, they must be re-installed in the correct position.

PROCEDURE:

1. The master eject clamper drive arm [B] must be flush with the cutout in the frame, as shown.
2. Holding the arm in the above position, install the sector gear [A] so that the small positioning hole in the sector gear exactly overlaps the positioning hole in the frame, as shown.

6.7 MASTER FEED SECTION

6.7.1 MASTER MAKING UNIT REMOVAL

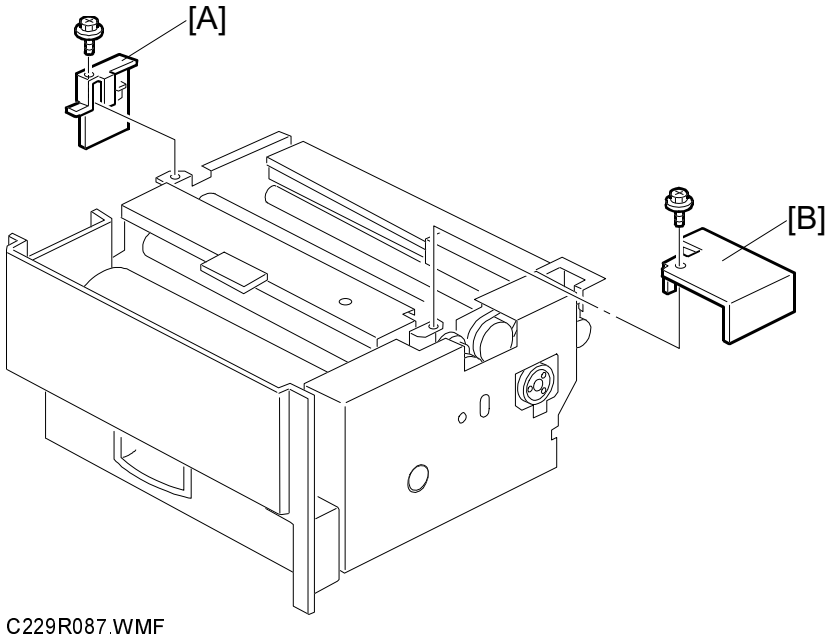


C229R034.WMF

First, slide out the master making unit [A].

Then, remove it (2 screws [B]).

6.7.2 MASTER SET ROLLER AND PLATEN ROLLER

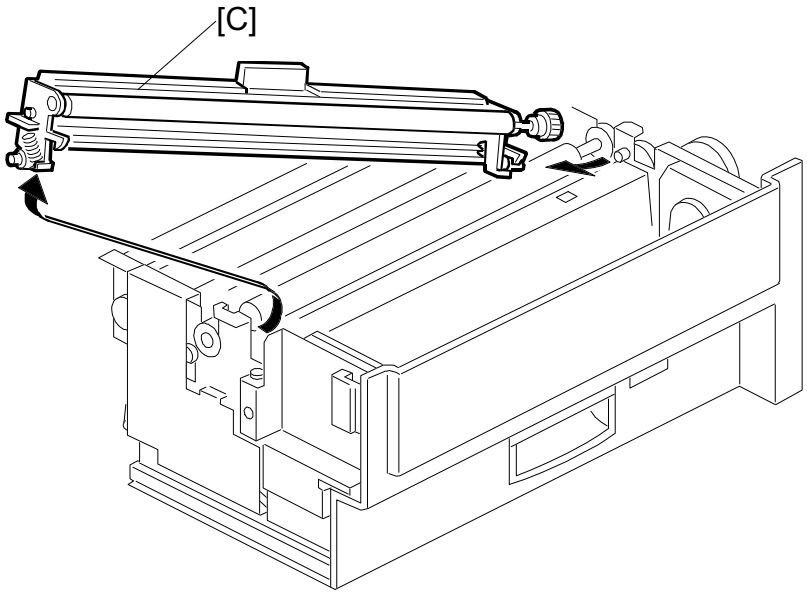


C229R087.WMF

First, remove the master making unit from the machine.

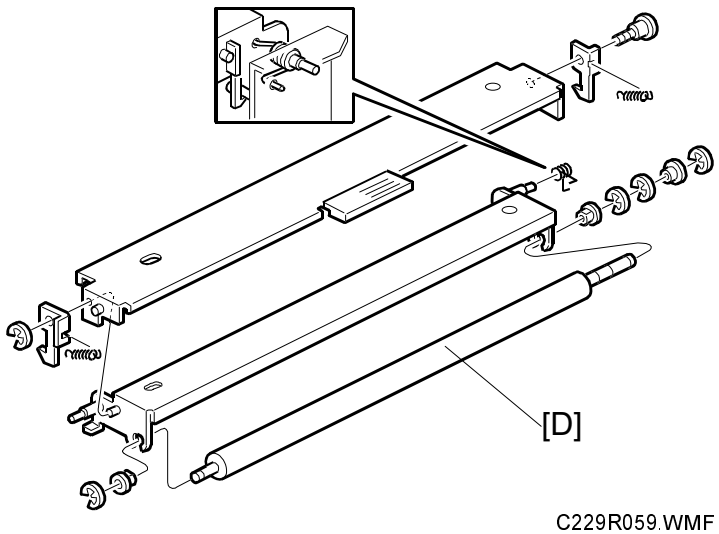
A: Front bracket

B: Rear bracket



C229R058.WMF

C: Master set roller unit

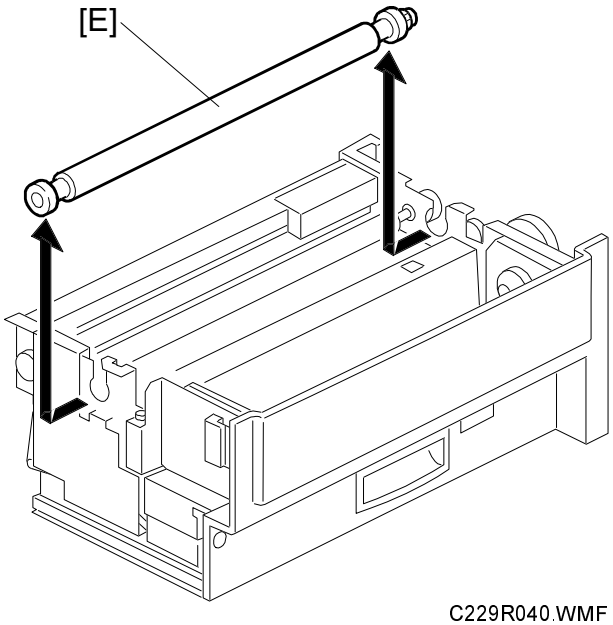


C229R059.WMF

Disassemble the master set roller unit

D: Master set roller

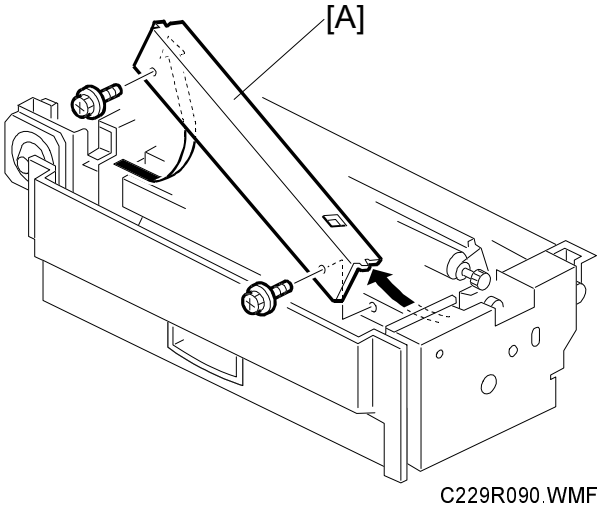
NOTE: When re-installing the springs at the non-operation side, refer to the above diagram.



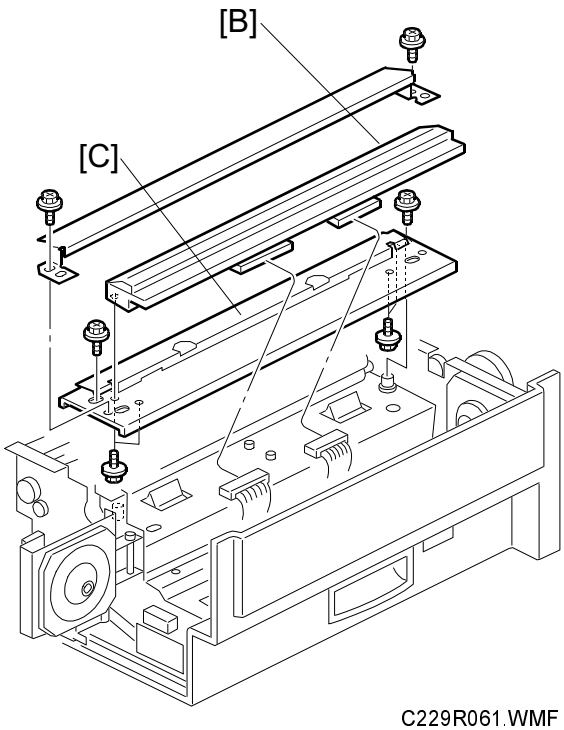
C229R040.WMF

E: Platen roller [E] (slide it towards the operation side)

6.7.3 THERMAL HEAD



C229R090.WMF



C229R061.WMF

First, remove the platen roller.

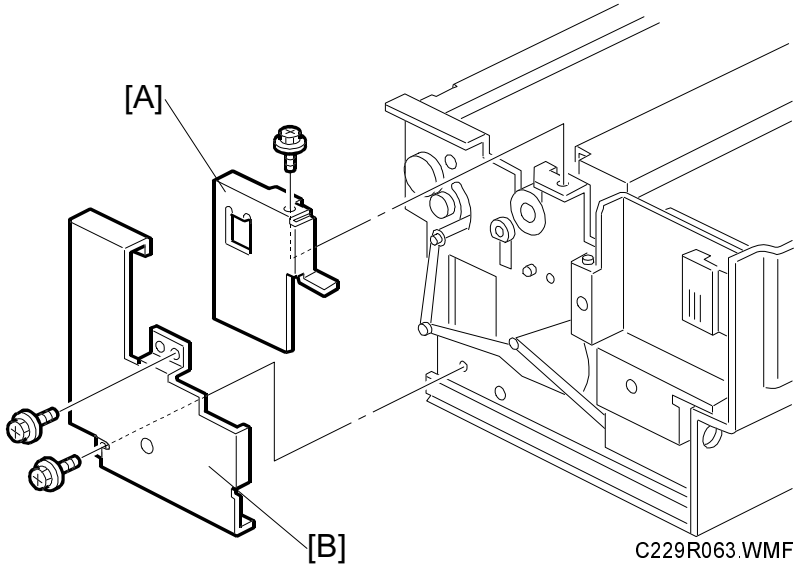
A: Thermal head cover

B: Thermal head (Disconnect the thermal head connectors)

CAUTION: 1) After the replacement, adjust the input voltage.
2) There is a small mylar [C] in the base. At reinstallation, make sure that it is in the correct position. (Refer to 6.7.10 Master Feed Mylar Positioning.)
3) Make sure that there is no foreign material on the thermal head surface (especially on the heating elements).
Don't touch the surface with bare hands. (If you touch it, clean the surface with alcohol.)
4) Similarly, do not touch the surface of the master film with bare hands.
5) Connect and disconnect the connectors carefully.
Keep them horizontal. Also, make sure that they are reconnected firmly.
6) Don't touch the terminals of the connectors with bare hands.

6.7.4 SENSORS, MOTORS, AND CUTTER IN THE MASTER MAKING UNIT

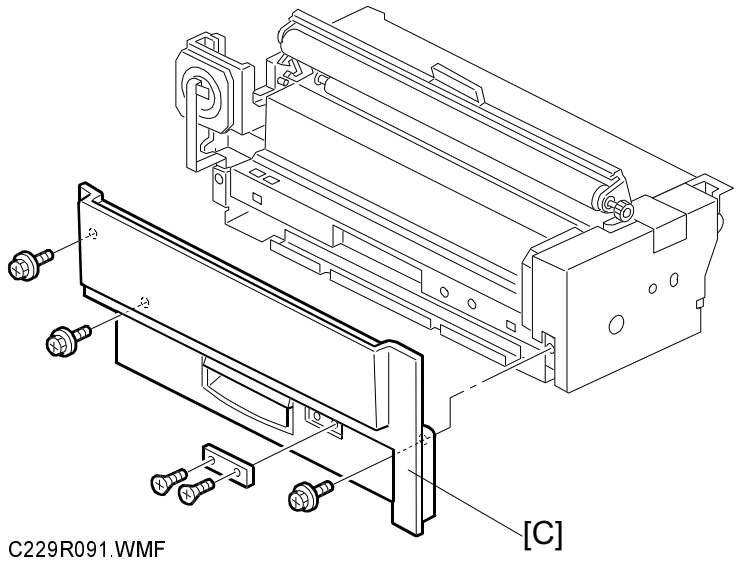
Duct Entrance Solenoid



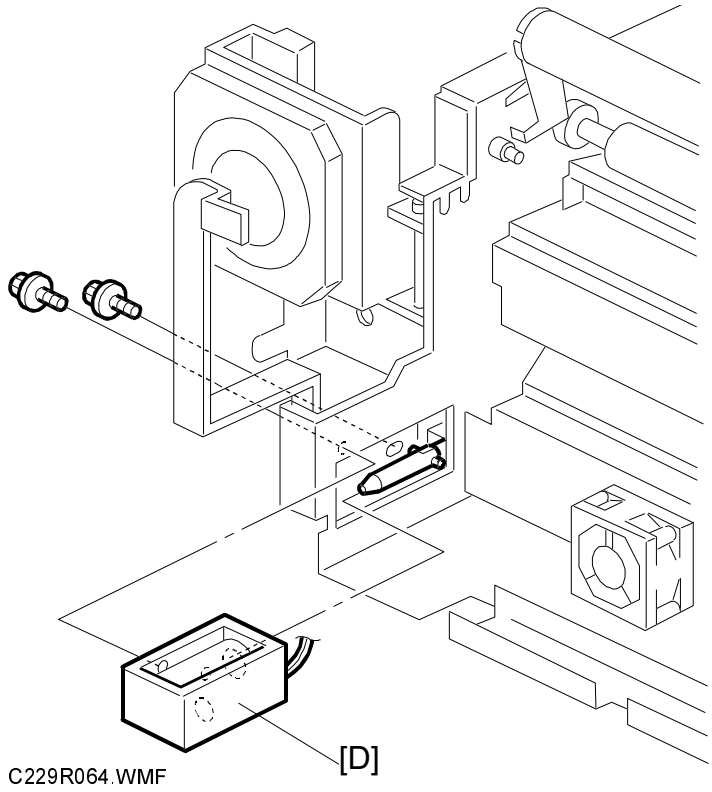
First, remove the master making unit from the machine.

A: Front platen roller bracket

B: Front cover

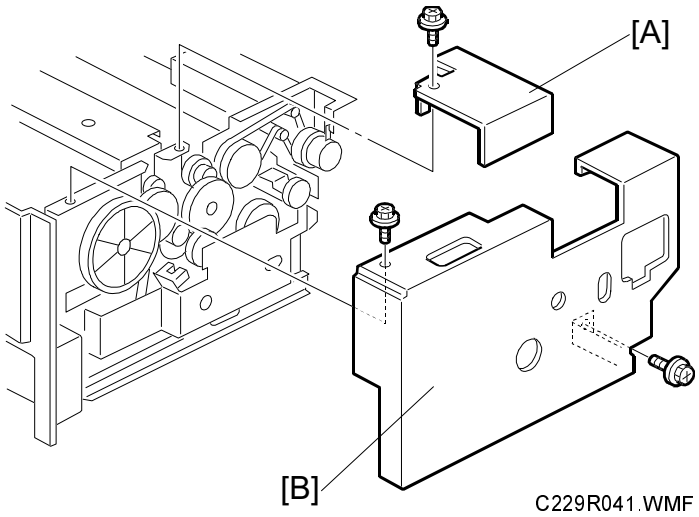


C: Master making unit right cover



D: Duct entrance solenoid

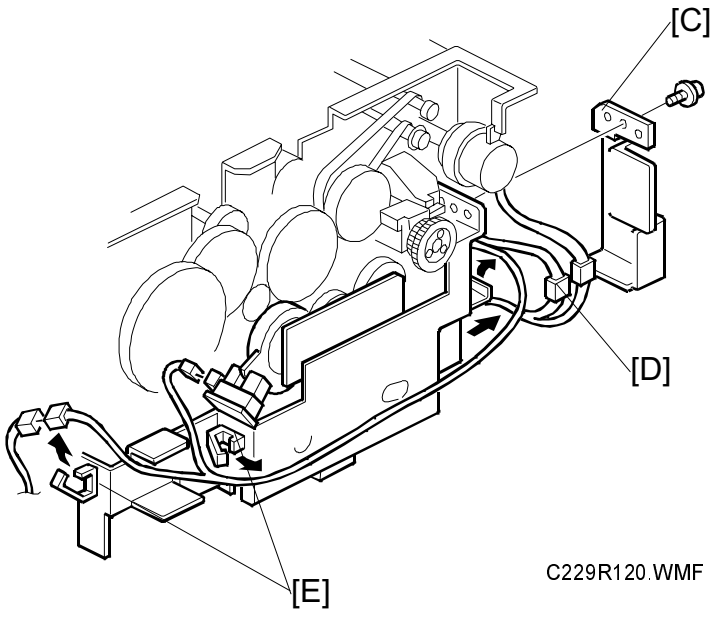
Cutter Unit, Platen Release Motor and Sensor, and Master Feed Clutch



First, remove the master making unit from the machine.

A: Rear platen roller bracket

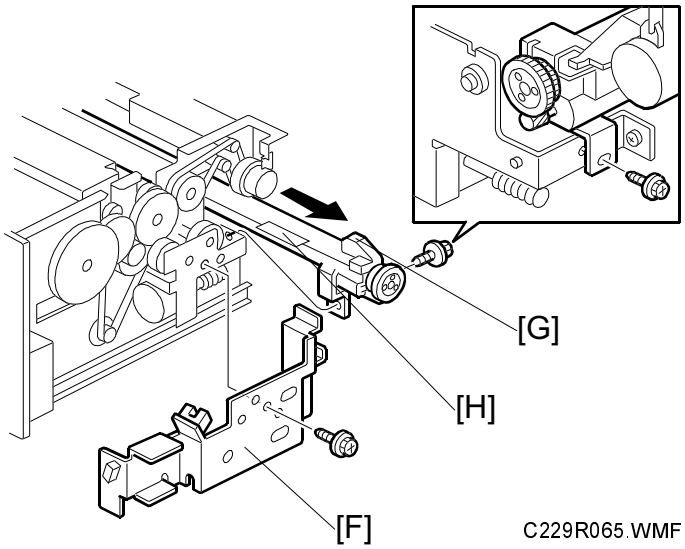
B: Rear cover



C: Cable cover

Disconnect the connector [D] between the cutter unit and the cable.

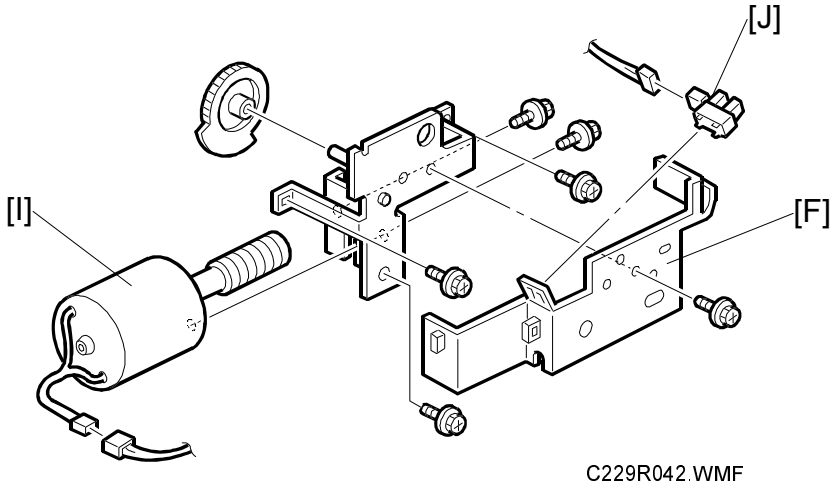
Unhook the wire from the cable clamps [E].



F: Cover bracket

G: Cutter unit

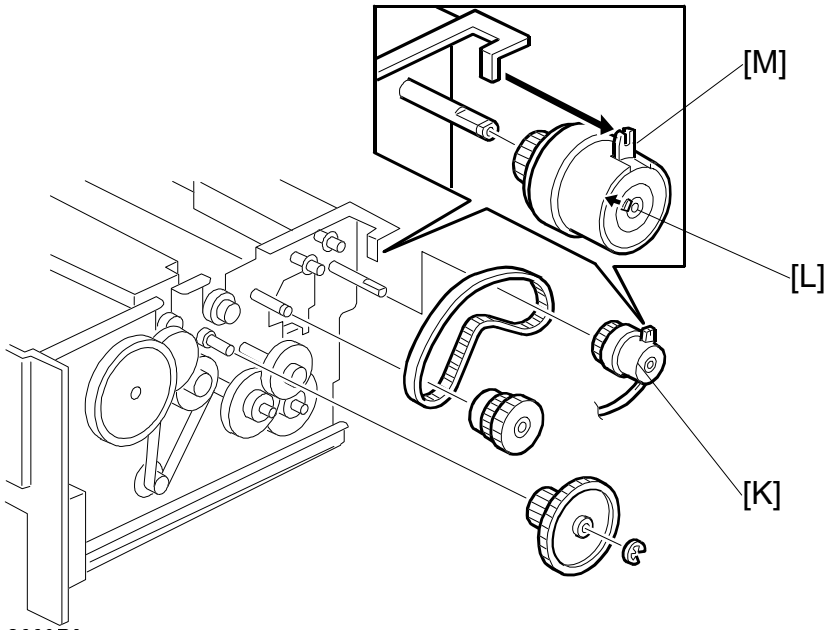
NOTE: Make sure that the mylar [H] is in the correct position when reinstalling the cutter unit. There are 6 of these mylars across the length of the cutter unit. (Refer to 6.7.10 Master Feed Mylar Positioning.)



I: Platen release motor

J: Platen release sensor

NOTE: Make sure that the gear is positioned correctly. Install it in accordance with 6.7.9 Platen Release Cam Adjustment section.

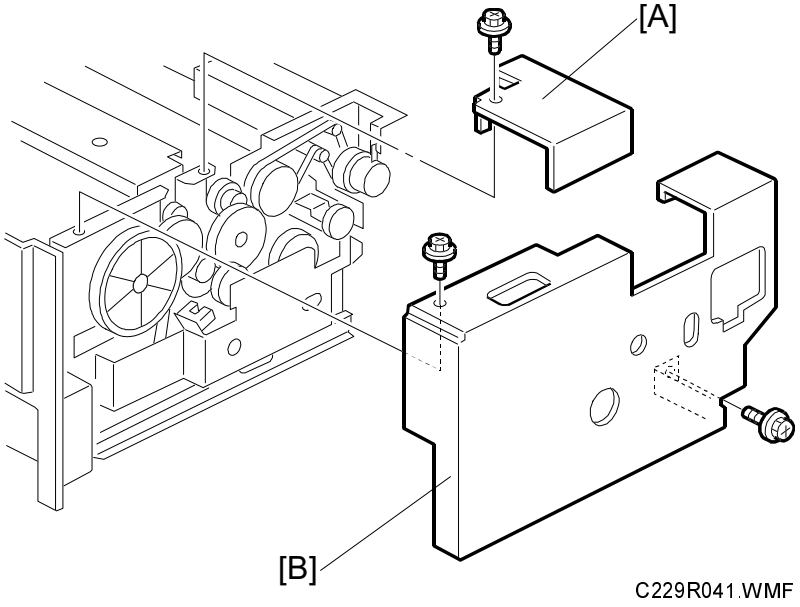


C229R043.WMF

K: Master feed clutch

NOTE: 1) Push the pawl [L] out from the centerto slide the clutch off the shaft.
2) At installation, make sure that the stopper [M] is positioned as shown.

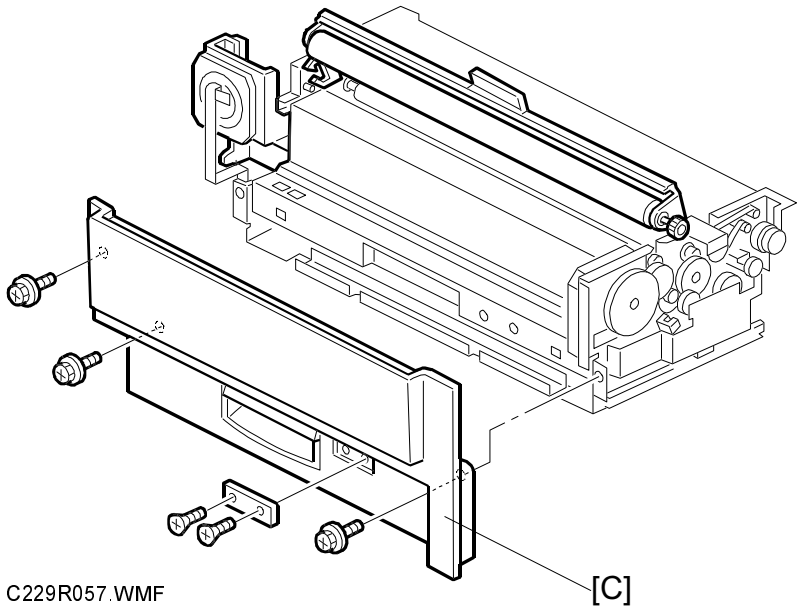
Master Feed Motor



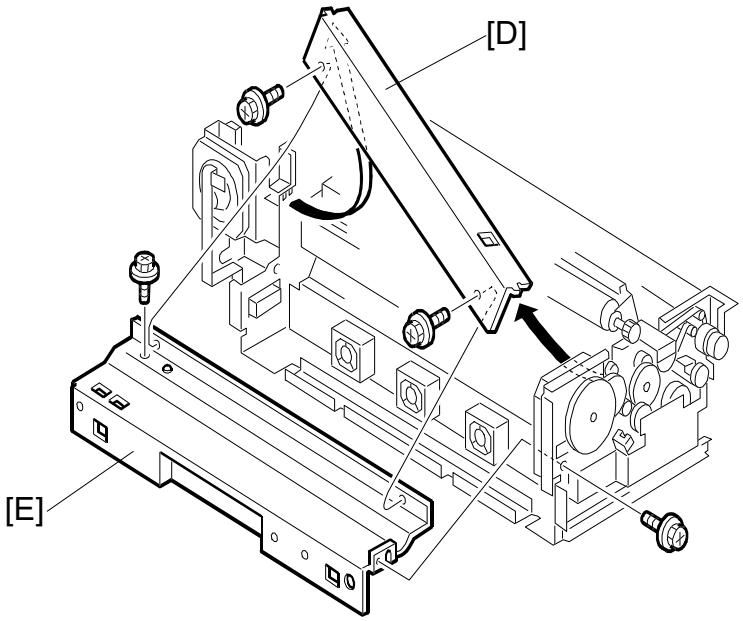
First, remove the master making unit from the machine.

A: Rear platen roller bracket

B: Master making unit rear cover



C: Master making unit right cover

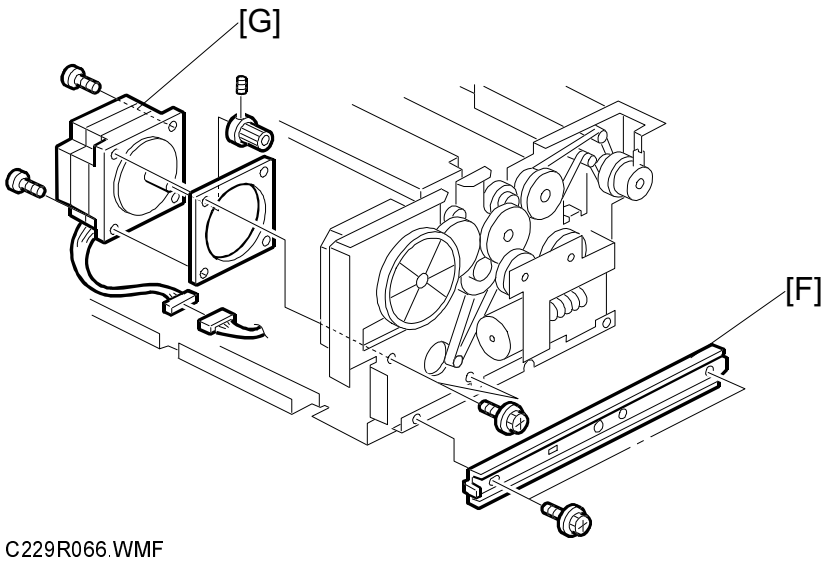


C229R060.WMF

D: Thermal head cover

E: Stay

NOTE: Take care when removing the thermal head and the stay because these are connected to a cable from a sensor.

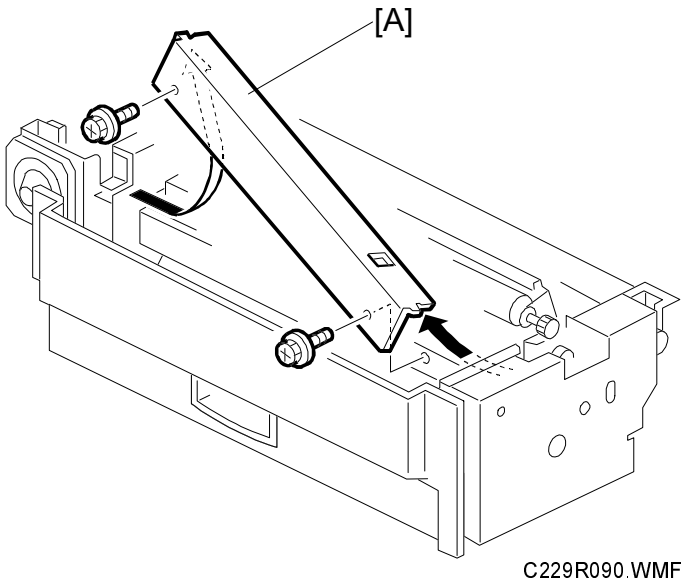


C229R066.WMF

F: Rail

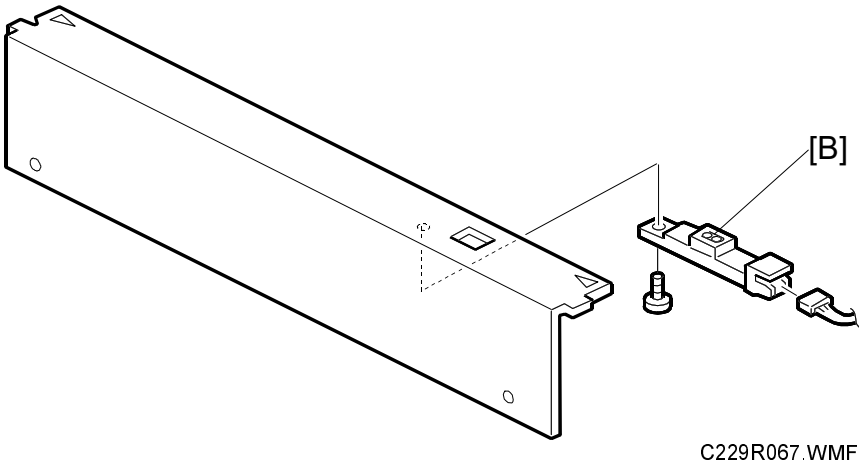
G: Master feed motor

Master Set Sensor



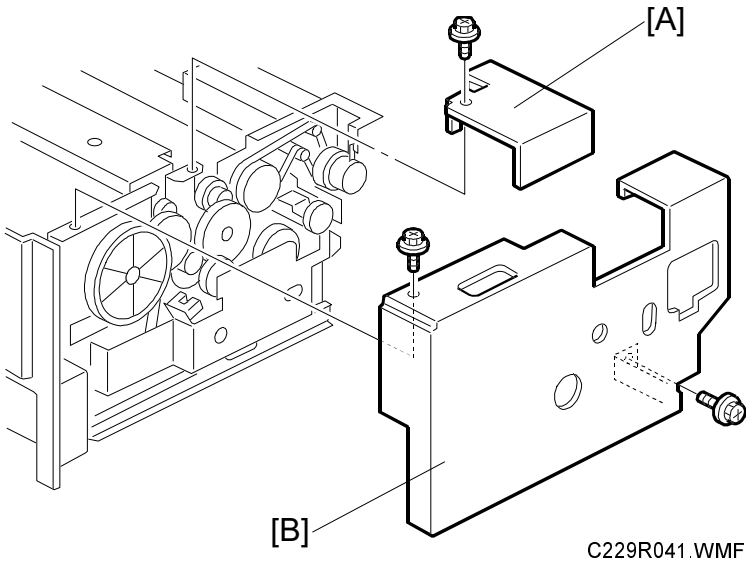
A: Thermal head cover

NOTE: Take care when removing the thermal head cover because it is connected to the cable from the sensor.



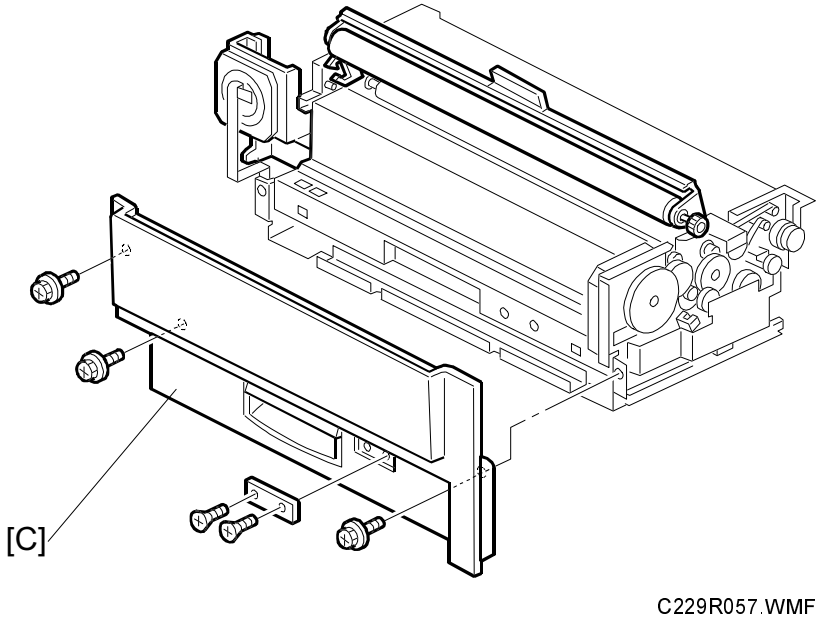
B: Master set sensor

Master End Sensor

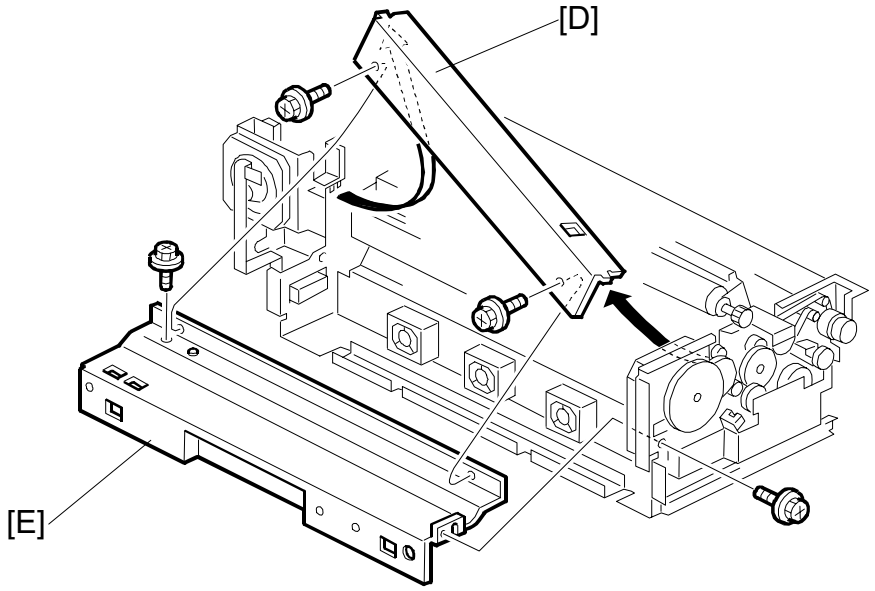


A: Rear platen roller bracket

B: Master making unit rear cover



C: Master making unit right cover

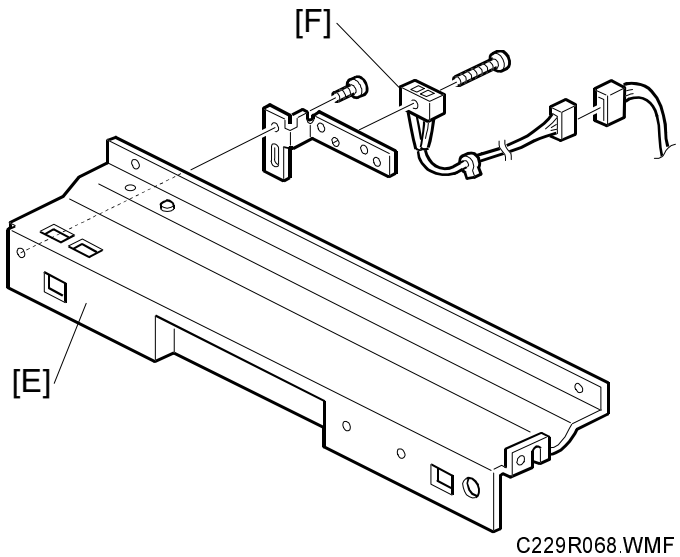


C229R060.WMF

D: Thermal head cover

E: Stay

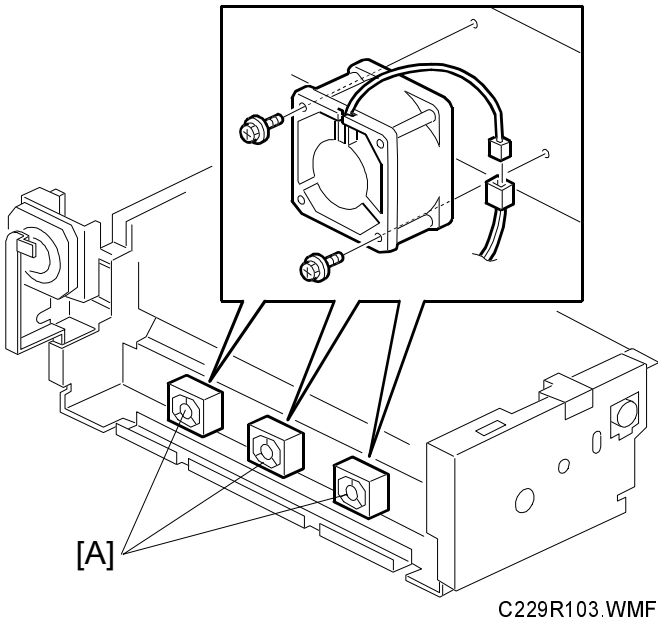
NOTE: Be careful when removing the thermal head cover and the stay because these are connected to cables from sensors.



C229R068.WMF

F: Master end sensor

6.7.5 MASTER VACUUM FAN POSITIONING



PURPOSE: To ensure that the master vacuum fans are installed the correct way around. If they are installed the wrong way around, there will be no suction in the master buffer duct, resulting in master jams.

PROCEDURE:

When installing the master vacuum fan, position the cable as shown in the diagram.

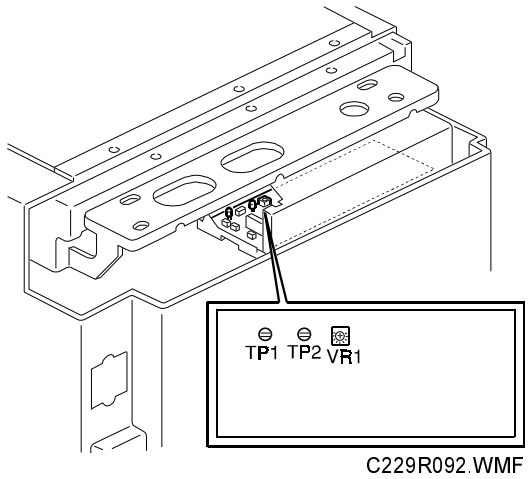
6.7.6 THERMAL HEAD VOLTAGE ADJUSTMENT

PURPOSE: To maintain printing quality when making masters and to extend the life time of the thermal head.

⚠CAUTION

- The voltage value affects the durability of the thermal head, and is different for each thermal head. Refer to the exact voltage value that is labeled on each thermal head.
- The adjustment range is between + 0 and – 0.1 volts from the specified value. Never set it out of this range even if there is an image quality problem.

1. Turn off the main switch. Then, remove the upper rear exterior cover to access the thermal head power supply board.
2. Check the voltage on the thermal head decal.
   NOTE: The value is different for each thermal head.
3. Turn on the main switch and access the SP mode (Clear Modes ⇒ 1 ⇒ 0 ⇒ 7 ⇒ Clear/Stop). Then, select SP 5-402 (the thermal head voltage adjustment of the output mode).



C229R092.WMF

4. Press the Start key to apply the voltage to the thermal head. The voltage is continually supplied while the Start key is held down.

   NOTE: As another way to apply the voltage, press the # key instead of the Start key. However, once the # key is pressed, the machine will not stop supplying the voltage until you press the Clear/Stop key or cancel the SP mode. To protect the thermal head, never leave the voltage on for a long time.

5. Measure the voltage between pins TP1 (VHD) and TP2 (GND) on the power supply board. Check that it is between + 0 and – 0.1 volts from the specified value that you read from the decal in step 2.
6. If needed, adjust the voltage by turning VR1 on the power supply board.

   NOTE: - To increase the voltage: Turn VR1 clockwise
   - To reduce the voltage: Turn VR1 counterclockwise

7. Press the Clear Modes key to leave the SP mode.

6.7.7 MASTER END SENSOR ADJUSTMENT

PURPOSE: To ensure that the sensor detects the end mark (a solid black area) on the master roll.

CAUTION: 1) The sensor adjustment is required in the following cases:
- When the sensor is replaced.
- When the MPU is replaced.

2) If the sensor is dirty, clean or replace it.
3) For how to access the SP mode, refer to the Service Program Mode section.

PROCEDURE:

1. Turn on the main switch, then access SP6-20-4 (Sensor Voltage and Threshold Adjustment for Master End Sensor).
2. The sensor threshold value is displayed on the operation panel. Enter 0.5 (volts) with the number keys.
3. Leave the SP mode.

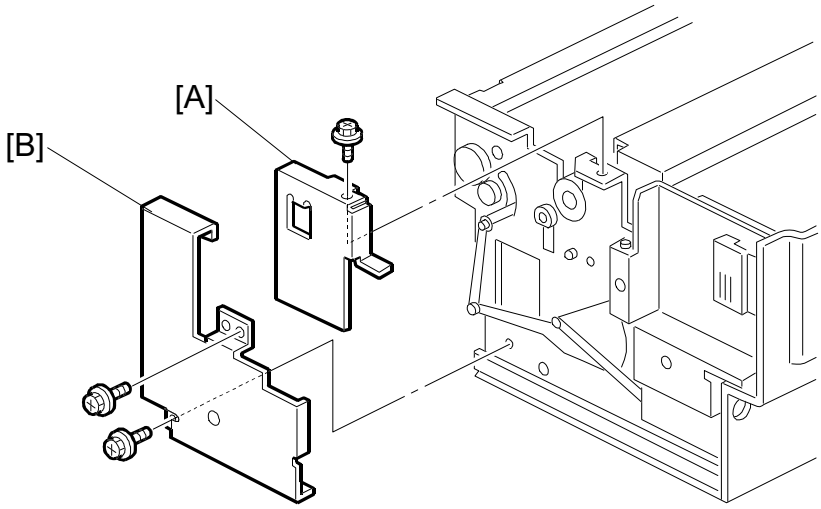
6.7.8 MASTER EDGE SENSOR ADJUSTMENT

PURPOSE: To ensure that the sensor detects the master properly.

CAUTION: 6) The sensor adjustment is required in the following cases:
- When the sensor is replaced.
- When the I/O board is replaced.

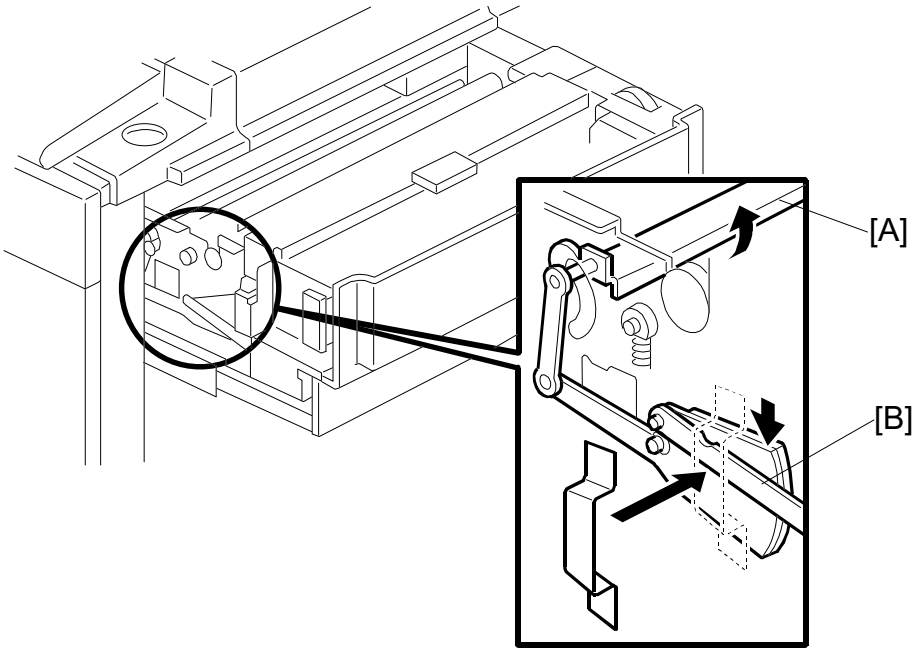
7) While adjusting, make sure to attach all exterior covers to avoid external light.
8) Do not turn the VRs excessively. Turn slowly until the LED turns off.
9) If the sensor is dirty, clean or replace it.
10) For how to access the SP mode, refer to the Service Program Mode section.

PROCEDURE:

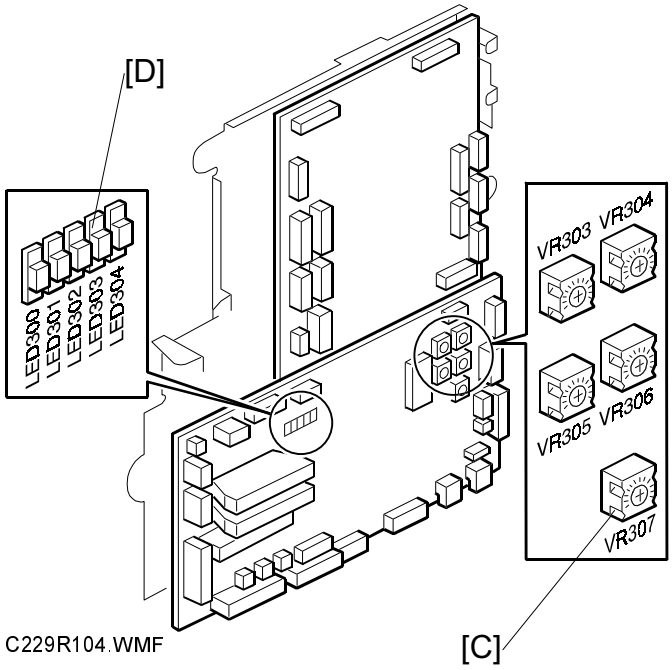


C229R063.WMF

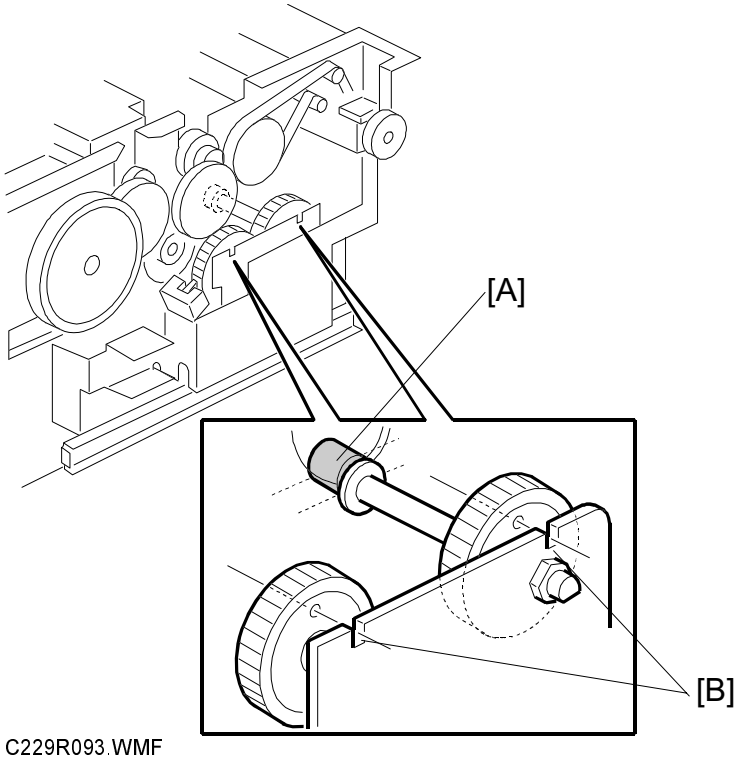
1. Slide out the master making unit.
2. Remove the master roll.
   NOTE: The master roll must not be installed for this adjustment.
3. Remove the front platen roller bracket [A] and the front cover [B].



4. Close the duct entrance plate [A] by hand and secure the link [B] with tape.
   NOTE: This procedure must be done to obtain fine adjustment.
5. Slide in the master making unit and make sure that the drum is installed.
6. Turn on the main switch, then access SP6-20-6 (Sensor Voltage and Threshold Adjustment for Master Edge Sensor).
7. Remove the rear cover and access the I/O board. Turn VR307 [C] clockwise until LED303 [D] lights.
8. The sensor input voltage is displayed on the operation panel. Check that it is between 0.85 and 0.95 volts. If it is not, repeat step 7.
9. Leave the SP mode.



6.7.9 PLATEN RELEASE CAM ADJUSTMENT



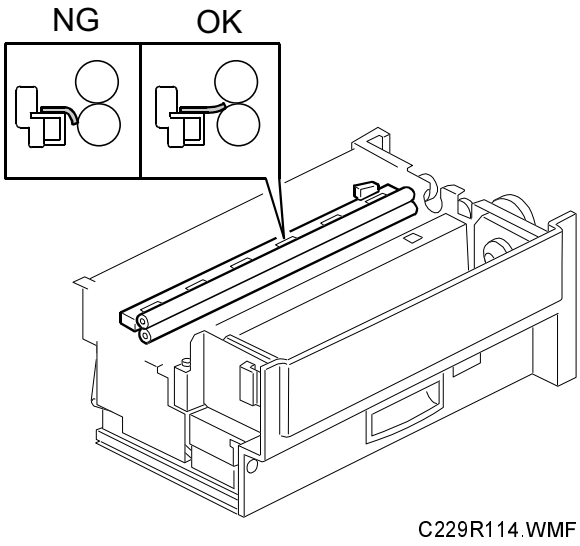
C229R093.WMF

PURPOSE: Once the platen pressure release mechanism is disassembled, the platen release cam [A] must be reinstalled in the correct position.

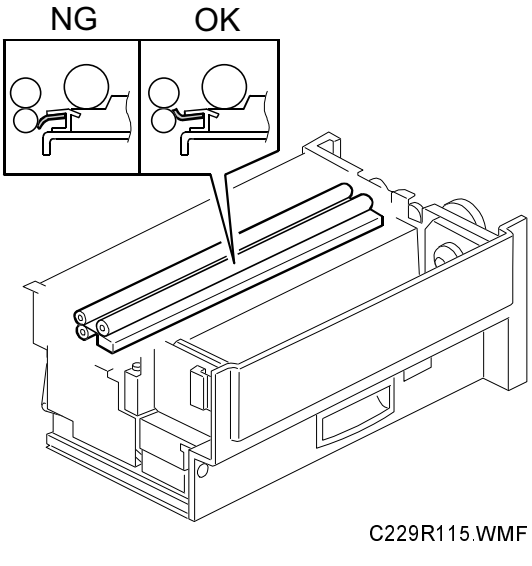
PROCEDURE:

When tightening the screws to secure the mechanism, make sure that the small holes in the gears [B] are in line with the cutouts in the bracket, as shown.

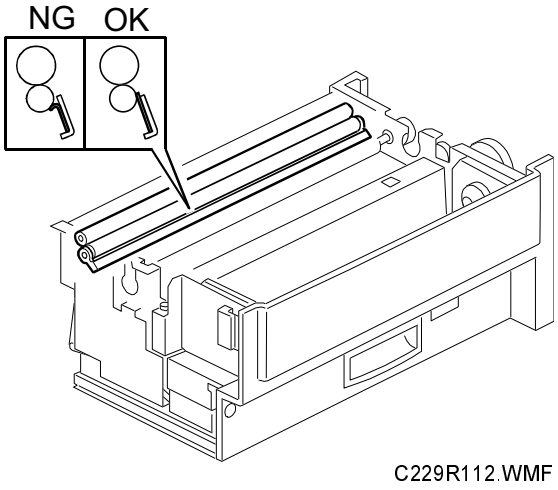
6.7.10 MASTER FEED MYLAR POSITIONING



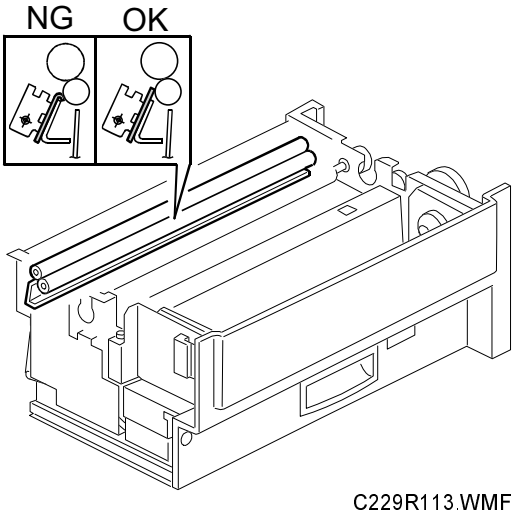
Cutter Unit
After the tension roller



Thermal Head Base
Before the tension roller



Buffer Duct Entrance Plate
Before the Master Feed Control Roller



Lower Master Feed Control Roller
Exit Guide Plate

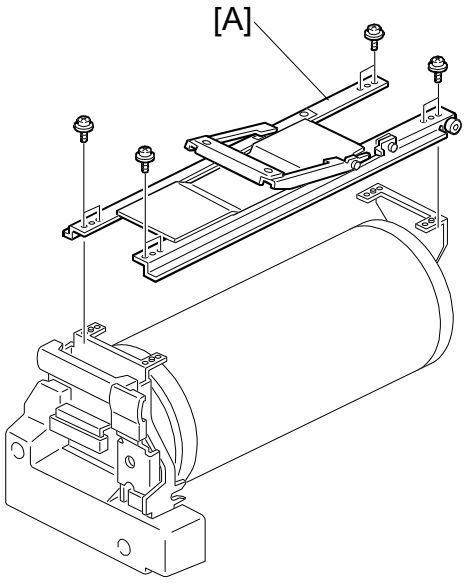
PURPOSE: These strips of mylar are easily put in the wrong position. Take care to set these properly to avoid master jams.

PROCEDURE:

When replacing or removing the thermal head, the cutter unit, the master duct, or the guide plate of the lower master feed control roller, install the lower tension roller or lower master feed control roller as shown in the illustration.

6.8 DRUM

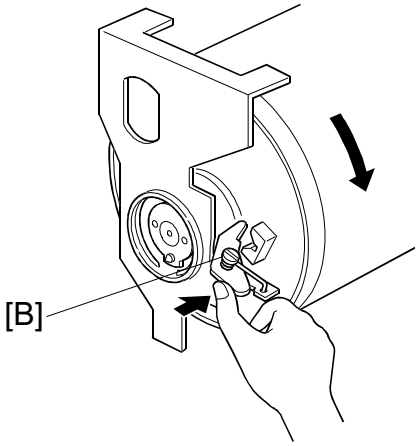
6.8.1 DRUM CLOTH SCREEN



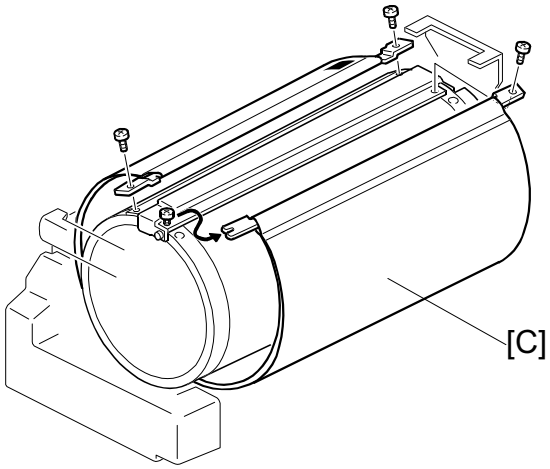
C229R045.WMF

1. Remove the drum guide [A].

NOTE: Do not settle the drum unit upside down. However, if you do settle it upside down, wipe off the ink around the ink roller beforehand (using SP 2-40, select OFF in ink detection mode, and feed paper until ink ends).

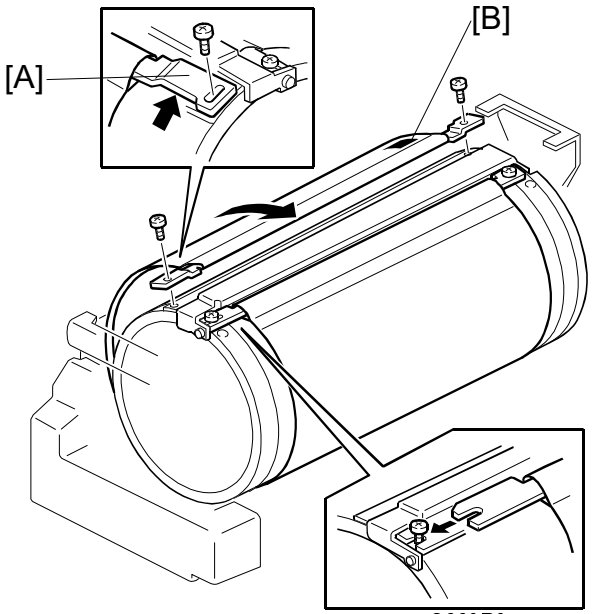


C229R086.WMF



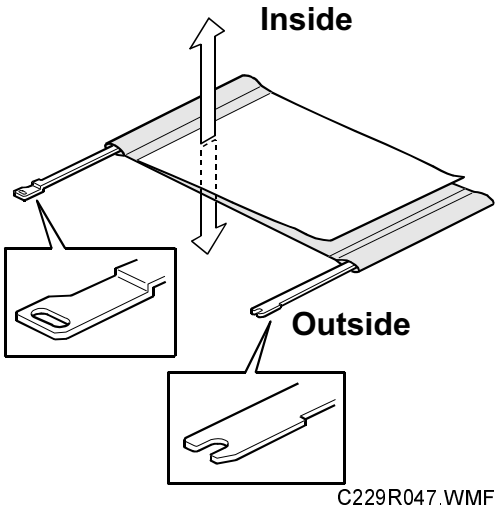
C229R046.WMF

2. Loosen the stopper [B] (the drum lock solenoid), then rotate the drum until the clamper unit is positioned on the top of the drum.
3. Remove the drum screen [C].



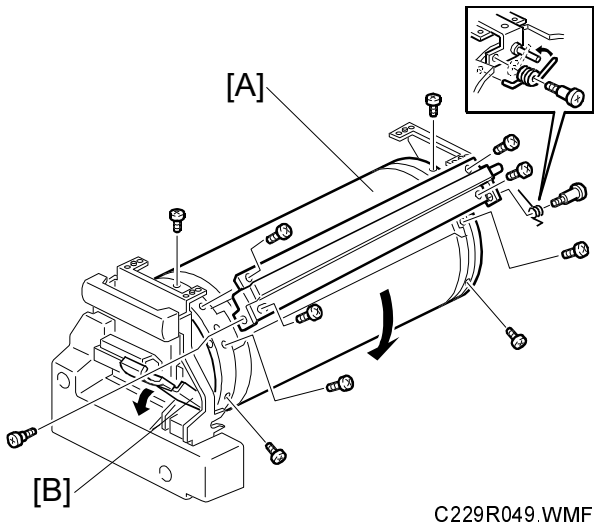
C229R048.WMF

CAUTION: 1) Do not scratch the cloth screen or metal screen.
2) When replacing the cloth screen, spread the screen around the metal screen while strongly pulling the stay [A]. Adjust the stay so that it is parallel to the master clamper, then tighten the screws.
3) When installing the new screen, the black sensor patches [B] must be to the left of the master clamper. (Position the clamper on the top of the drum, and view from the operation side - refer to the upper illustration.)
4) Make sure that the correct side of the screen is facing up. (Refer to the lower illustration.)
5) Make sure that the stays for securing the cloth screen are positioned correctly. (Refer to the lower illustration.)
6) Make sure that the inside screen is not wrinkled while spreading it around the drum.



C229R047.WMF

6.8.2 DRUM MASTER CLAMPER AND METAL SCREEN

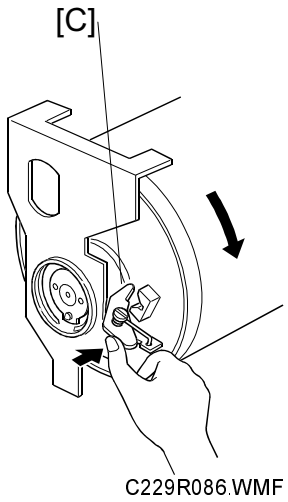


C229R049.WMF

NOTE: Remove the cloth screen first.

1. Remove the drum clamper [A].

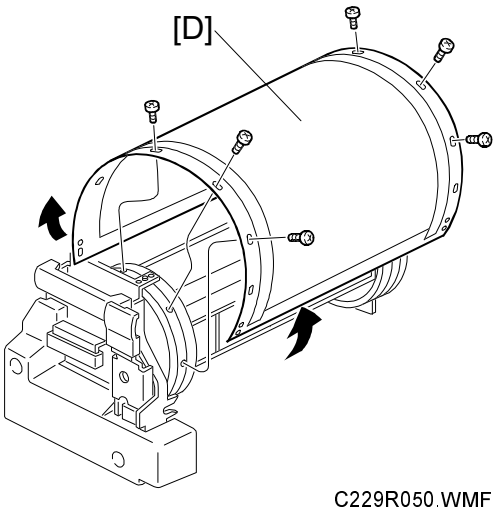
   NOTE: To remove the clamper screws on the operation panel side, turn the drum into position and pull out the lever [B]. To rotate the drum, release the stopper [C] on the rear of the drum.



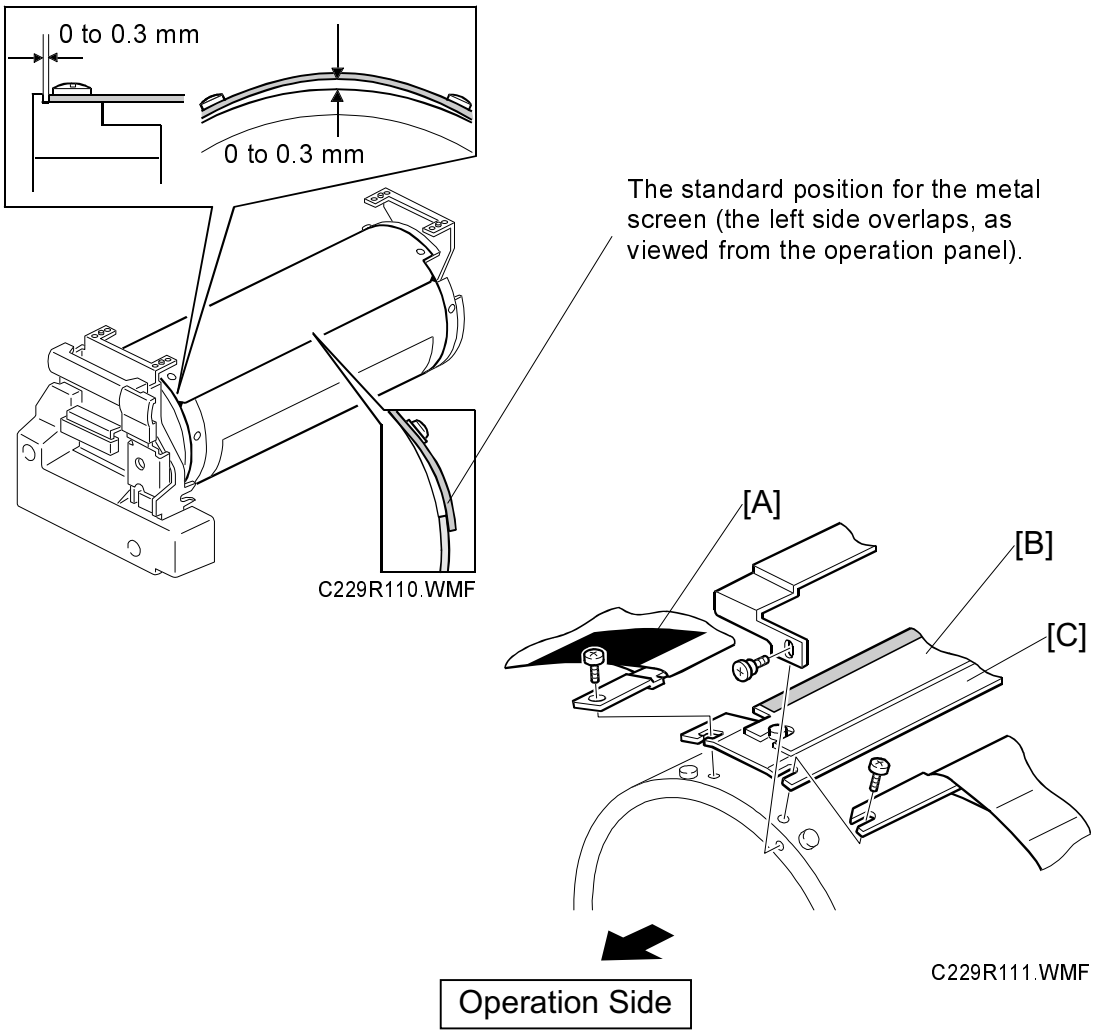
C229R086.WMF

CAUTION: 1) When replacing the drum clamper, install the spring on the opposite side as shown in the illustration.
2) Do not settle the drum unit upside down. However, if you do settle it upside down, wipe off the ink around the ink roller beforehand (using SP 2-40, select OFF in ink detection mode, and feed paper until ink ends).

2. Remove the metal screen [D].



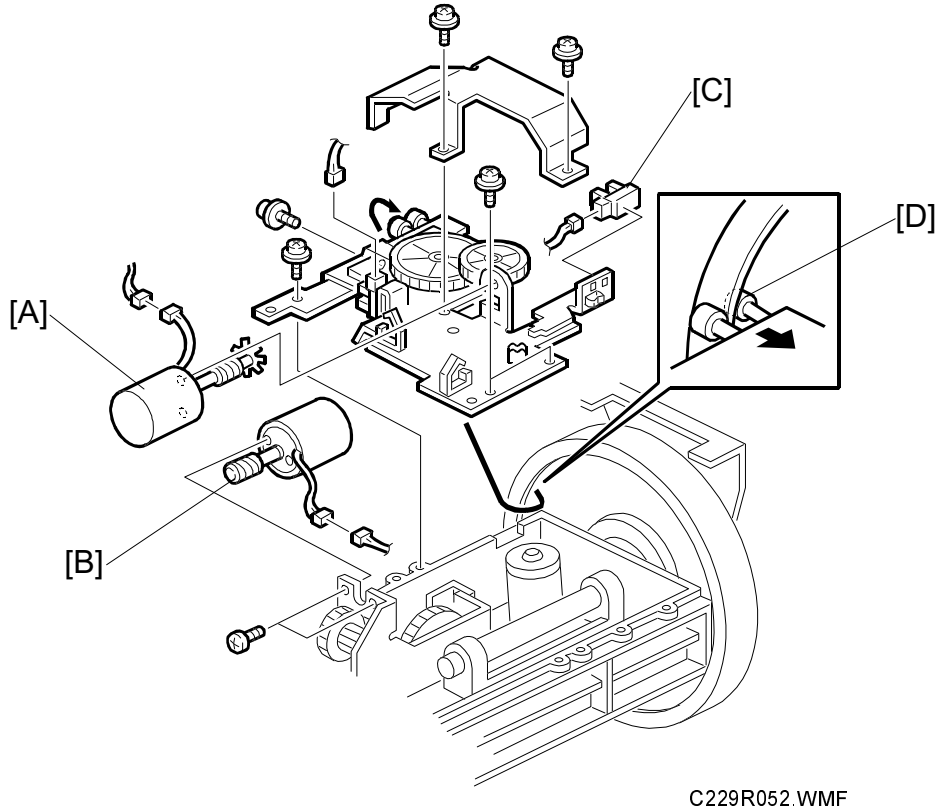
C229R050.WMF



CAUTION:

1) Do not scratch the cloth screen or metal screen.
2) Make sure that the correct end of the metal screen is overlapping. (Refer to the lower right part of the upper illustration.)
3) When attaching the metal screen to the drum flanges, wrap it so that the gap is correct. (Refer to the upper part of the upper illustration.)
4) When installing the master clamper [C], make sure that it is the correct way around. The side with the sandpaper [B] must be facing the black patch [A].
5) Do not allow the inside of the master clamper to become dirty with ink. If it is dirty with ink, the master may slip off and the image position on the prints will move toward the trailing edge of the print during a printing run.
6) Use a cloth dampened with water to clean the inside of the master clamper. Do not use alcohol or other solvents. The clamping force of the magnet will be weakened.

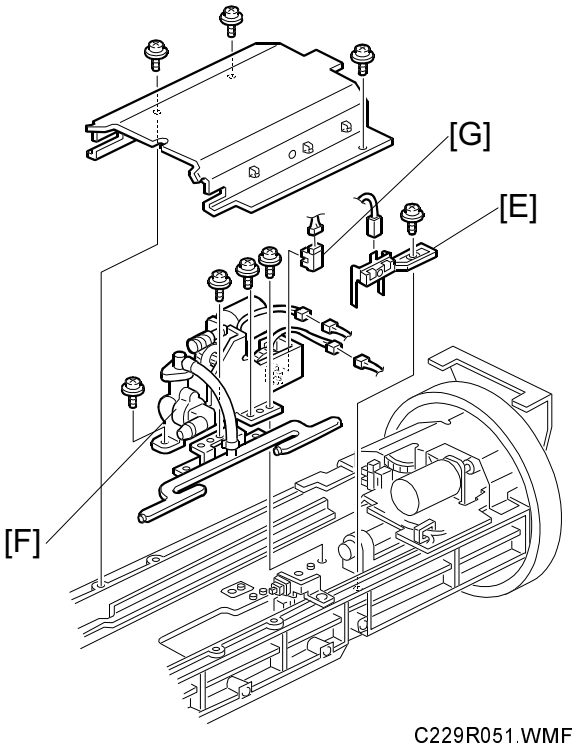
6.8.3 MOTORS AND SENSORS IN THE DRUM



NOTE: Remove the cloth screen and metal screen first.

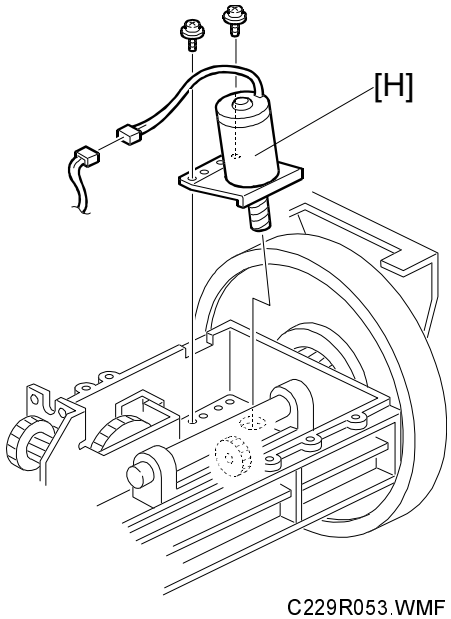
1. First, pull out the ink cartridge holder.
   A: Drum shift motor
   B: Ink pump motor
   C: Drum shift HP sensor

   NOTE: When reinstalling the drum shift motor unit, insert the bearings [D] into the drum flange edge, as shown.



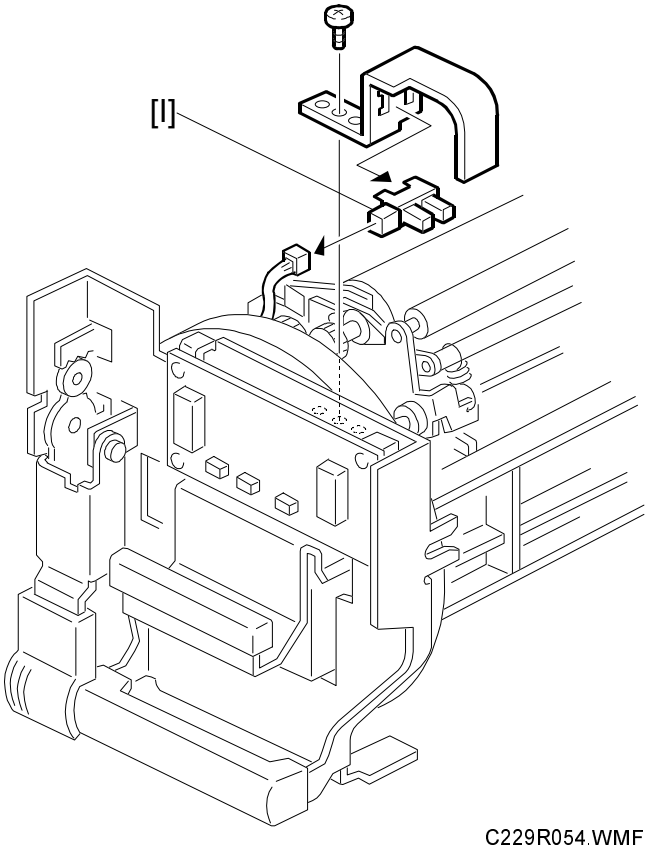
C229R051.WMF

2. E: Ink detection pin
3. First, remove the ink pump unit.
   F: Ink pump
   G: Ink pump sensor



C229R053.WMF

4. H: Idling roller motor



C229R054.WMF

5. First, remove the sensor bracket (1 screw).
   I: Idling roller HP sensor

6.8.4 FIRST DRUM MASTER SENSOR ADJUSTMENT

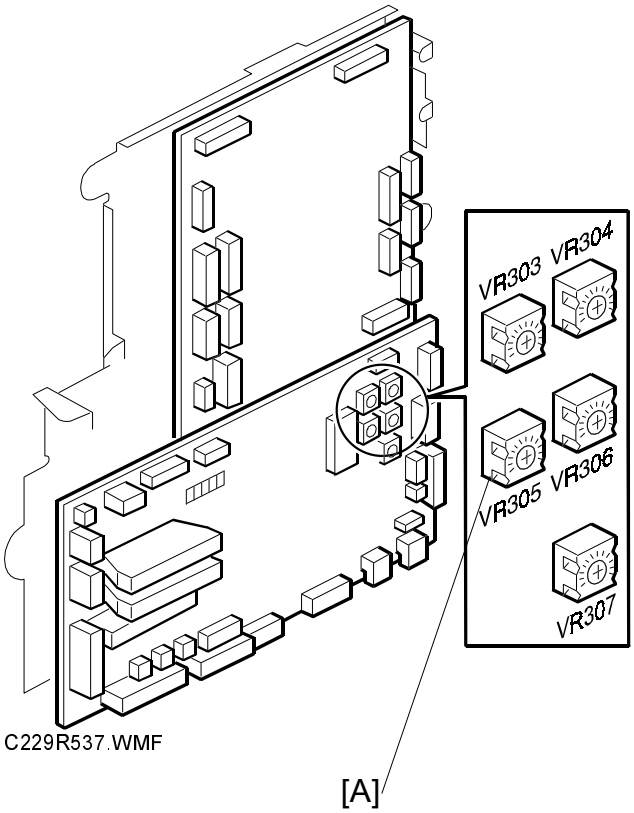
PURPOSE: To ensure that the sensor detects the master properly.

CAUTION: 1) The sensor adjustment is required in the following cases:
- When the sensor is replaced.
- When the I/O board is replaced.

2) While adjusting, make sure to attach all exterior covers to avoid external light.
3) Do not turn the VRs excessively.
4) If the sensor is dirty, clean or replace it.
5) For how to access the SP mode, refer to the Service Program Mode section.

PROCEDURE:

1. Remove the master that is wrapped around the drum, and install the drum in the main body.
2. Turn on the main switch, then access SP6-20-2 (Sensor Voltage and Threshold Adjustment for 1st Drum Master Sensor).
3. Remove the rear cover and access the I/O board.
4. Adjust VR305 [A] so that the sensor input voltage displayed on the operation panel becomes between 1.0 and 1.5 volts.
5. Leave the SP mode.



C229R537.WMF

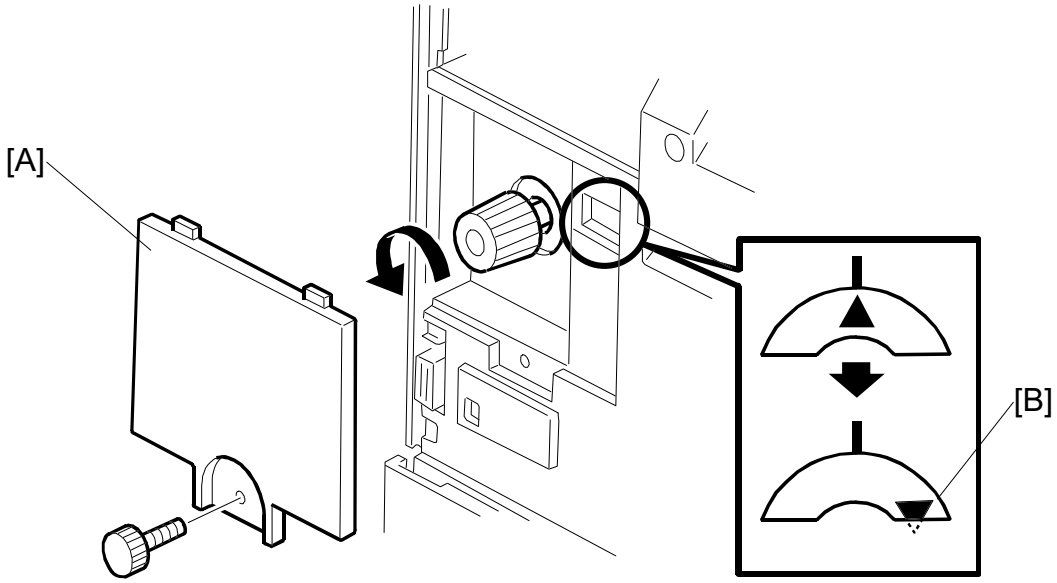
6.8.5 SECOND DRUM MASTER SENSOR ADJUSTMENT

PURPOSE: To ensure that the sensor detects the master properly.

PROCEDURE:

CAUTION: 1) The sensor adjustment is required in the following cases:
- When the sensor is replaced.
- When the I/O board is replaced.

2) While adjusting, make sure to attach all exterior covers to avoid external light.
3) Do not turn the VRs excessively.
4) If the sensor is dirty, clean or replace it.
5) For how to access the SP mode, refer to the Service Program Mode section.

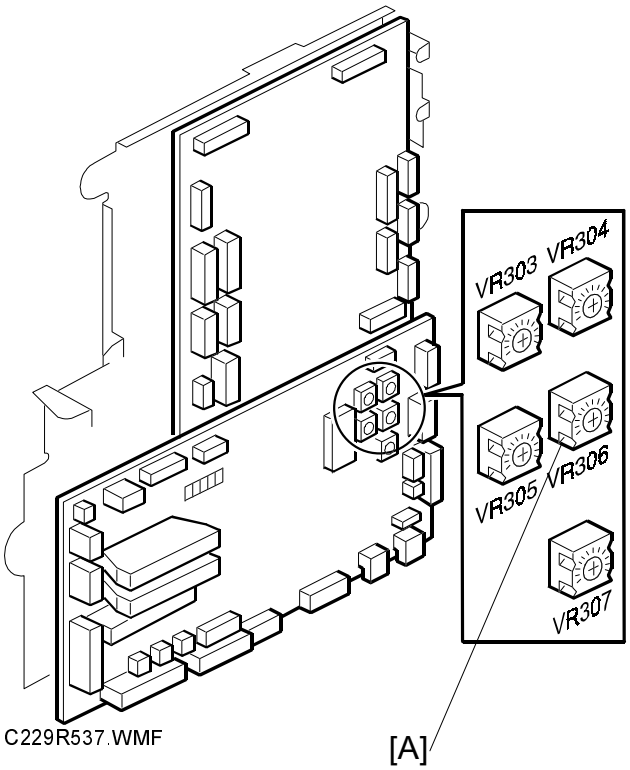


C229R534.WMF

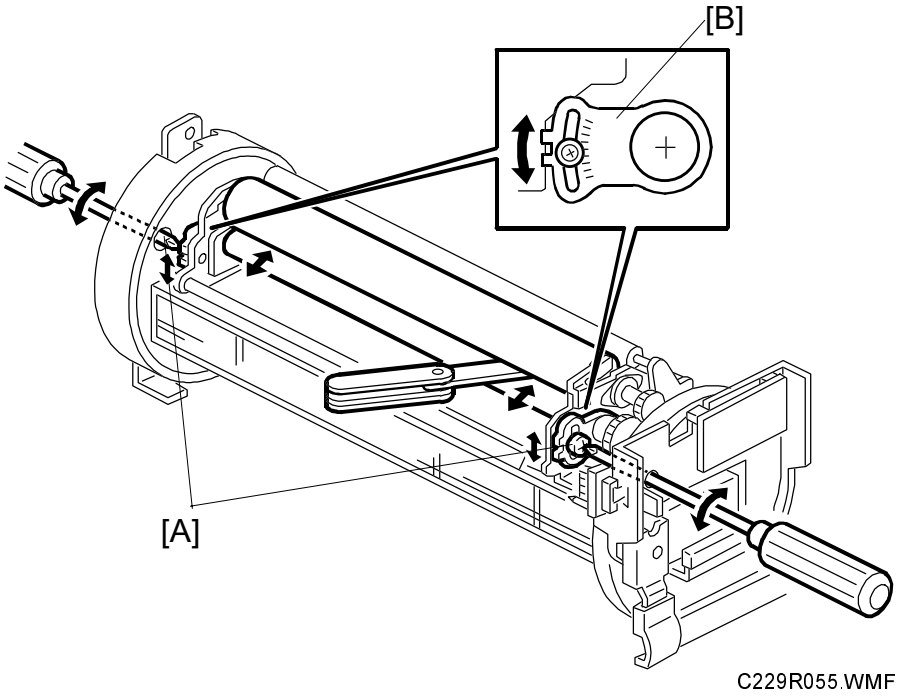
1. Remove the master that is wrapped around the drum, and install the drum in the main body.
2. Remove the knob cover [A] and turn the knob until the indicator moves to the point shown [B].

NOTE: This step moves the black patch on the drum screen to the sensor.

3. Remove the rear cover and access the I/O board.
4. Fully turn VR306 [A] counterclockwise.
   NOTE: The sensor output becomes minimum.
5. Turn on the main switch, then access SP6-20-3 (Sensor Voltage and Threshold Adjustment for 2nd Drum Master Sensor).
6. The sensor input voltage is displayed on the operation panel. Check if it is 0.3 volts or more.
7. If the sensor input voltage is 0.3 volts or more, adjustment is completed.
8. If the sensor input voltage is less than 0.3 volts, adjust VR306 [A] so that the sensor input voltage becomes between 0.3 and 0.4 volts.
9. Leave the SP mode.



6.8.6 INK ROLLER GAP ADJUSTMENT



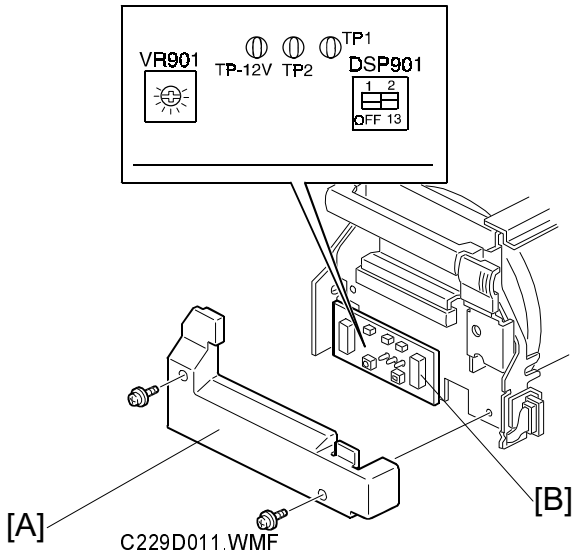
PURPOSE: To ensure that ink on the ink roller spreads evenly on the drum screen.

PROCEDURE:

1. Take out the drum unit from the machine.
2. Remove the cloth and metal screens from the drum unit.
3. Wipe off the ink around the ink roller and the doctor roller.
4. Insert a 0.08-mm gap gauge between the doctor roller and the ink roller. Then, make sure that a 0.1-mm gauge cannot pass through the gap.

   NOTE: Check the gap at the left, center, and right.
5. If the gap is not correct, loosen the screws [A] on both sides and adjust the gap by turning the eccentric bushings [B] at each side.

6.8.7 INK DETECTION ADJUSTMENT



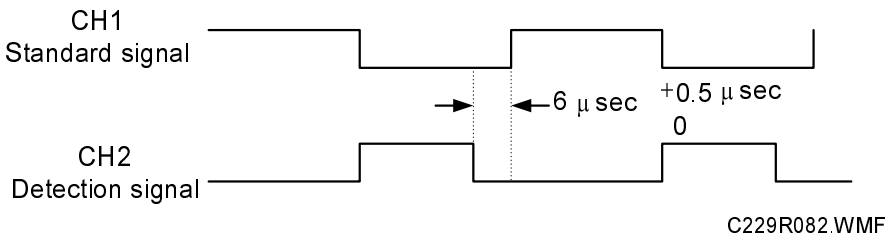
PURPOSE: To ensure correct detection of a no ink condition when all the ink has been consumed.

NOTE: For this adjustment, there must be no ink on the ink roller.

PROCEDURE:

1. Remove the drum front cover [A].
2. On the ink detection board [B], connect the probes and the grounding lead of an oscilloscope as follows:
   - Probe CH1 to TP1
   - Probe CH2 to TP2
   - Grounding lead to TP-12V

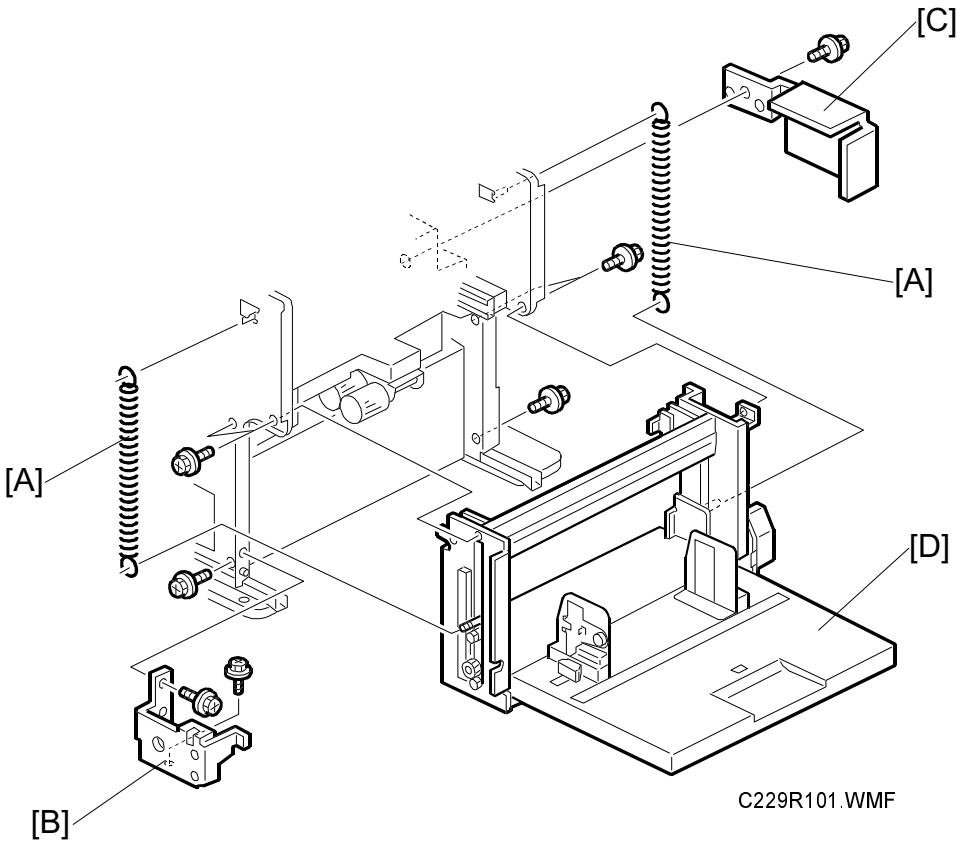
   (Select the 5 μs range.)
3. Turn on the main switch.
4. Make sure that the waveform is as shown in the top half of the following diagram when the ink detection pin is not in contact with the ink.



5. If incorrect, adjust the standard signal by turning VR901 on the ink detection board.

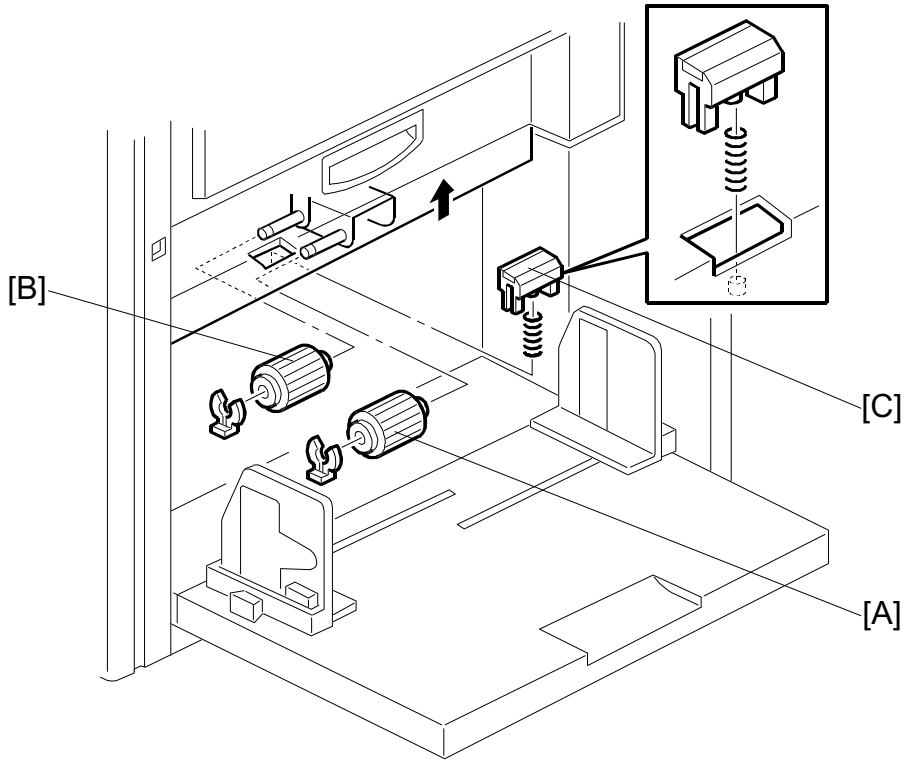
6.9 PAPER FEED SECTION

6.9.1 PAPER TABLE UNIT



1. Remove the inner cover and the rear cove. (See 6.1 Exterior section.)
2. From the rear of the machine, swing out the MPU. (See 6.4 MPU and PSU Opening Procedures.)
3. Remove the following parts:
   A: Two springs
   B: Front bracket (2 screws)
   C: Rear bracket (1 screw)
4. Disconnect 4 connectors going to the unit, then remove the paper table unit [D] (6 screws).

6.9.2 PAPER FEED ROLLER, PICK-UP ROLLER, AND FRICTION PAD



C229R513.WMF

A: Pick-up roller (1 clip)

B: Paper feed roller (1 clip)

C: Friction pad

6.9.3 PAPER WIDTH DETECTION BOARD

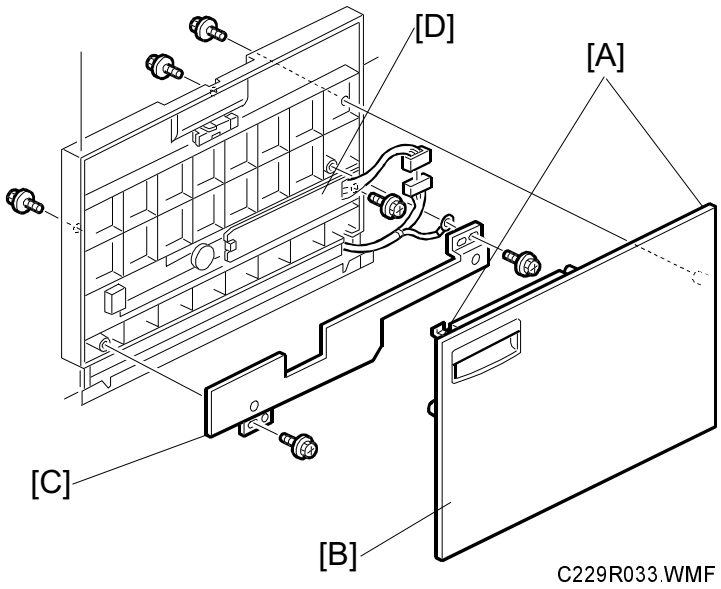
First, remove the rear cover (3 screws).

B: Paper table rear cover

NOTE: Carefully push out the 2 hooks [A] with a screwdriver.

C: Sensor cover (2 screws)

D: Paper width detection board (1 screw, 1 connector)



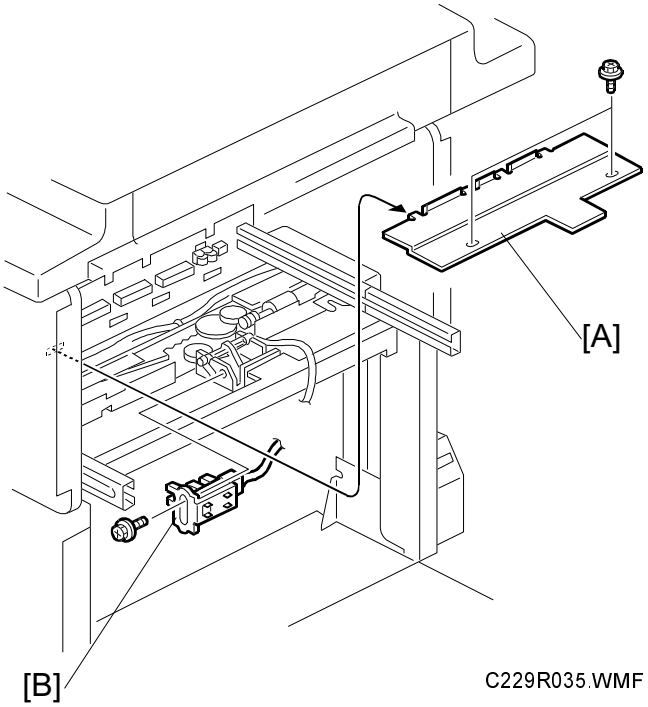
6.9.4 PAPER HEIGHT SENSOR

First, remove the master making unit (see 6.7.1 Master Making Unit Removal).

A: Feed cover (2 screws)

B: Paper height sensor (1 screw, 1 connector)

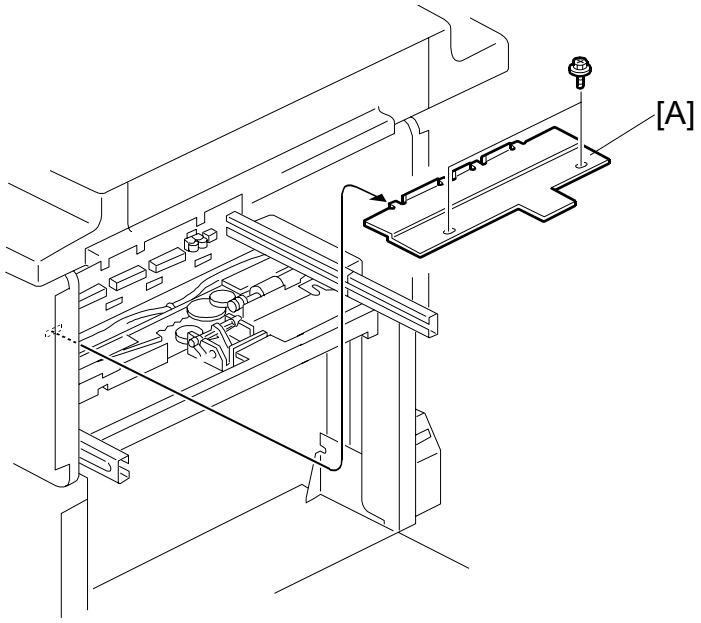
NOTE: When reinstalling the master making unit, push it in while pressing the rail with a forefinger. Then secure the screws.



6.9.5 FEED PRESSURE DETECTION BOARD

1. Remove the master making unit. (See 6.7.1 Master Making Unit Removal.)

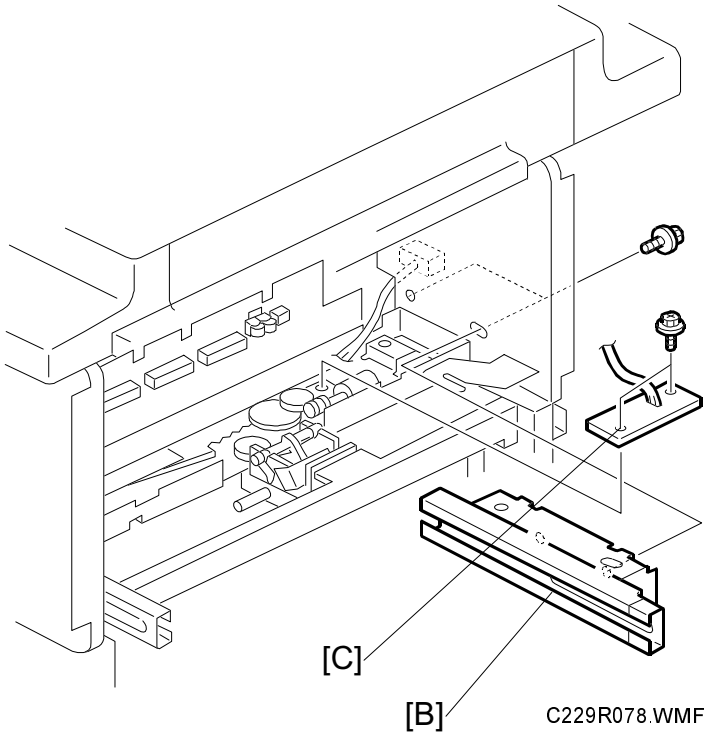
   A: Feed cover (2 screws)



C229R500.WMF

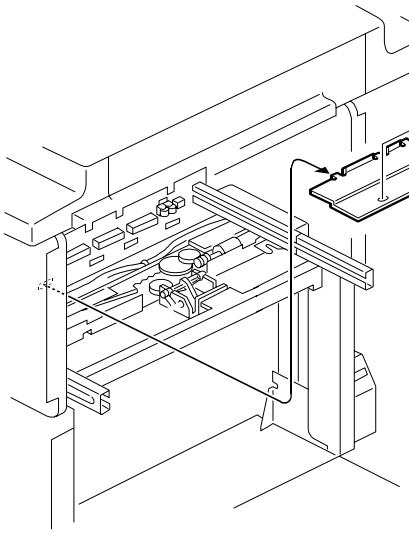
2. Swing out the MPU. (See 6.4 MPU and PSU Opening Procedures.)

   B: Rear rail guide
   C: Feed pressure detection board (2 screws)

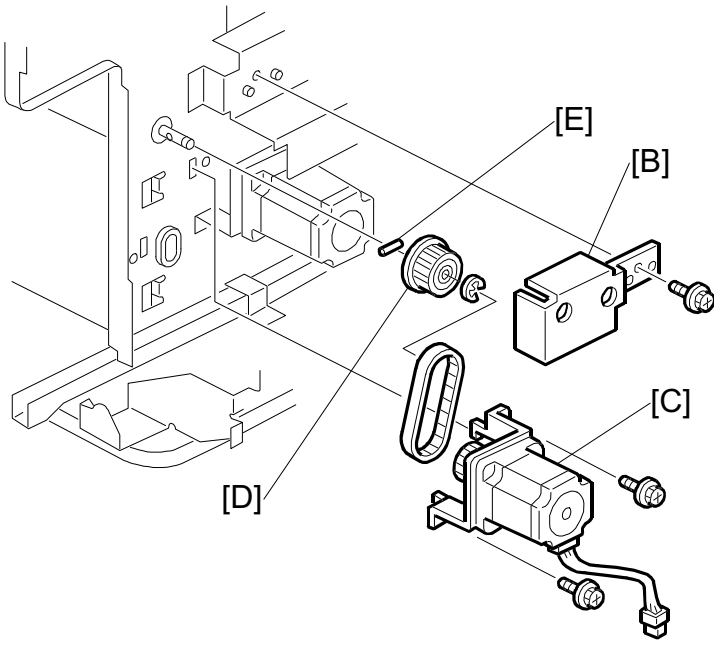


C229R078.WMF

6.9.6 PAPER REGISTRATION AND FEED TIMING SENSORS, AND UPPER REGISTRATION ROLLER



C229R500.WMF



C229R096.WMF

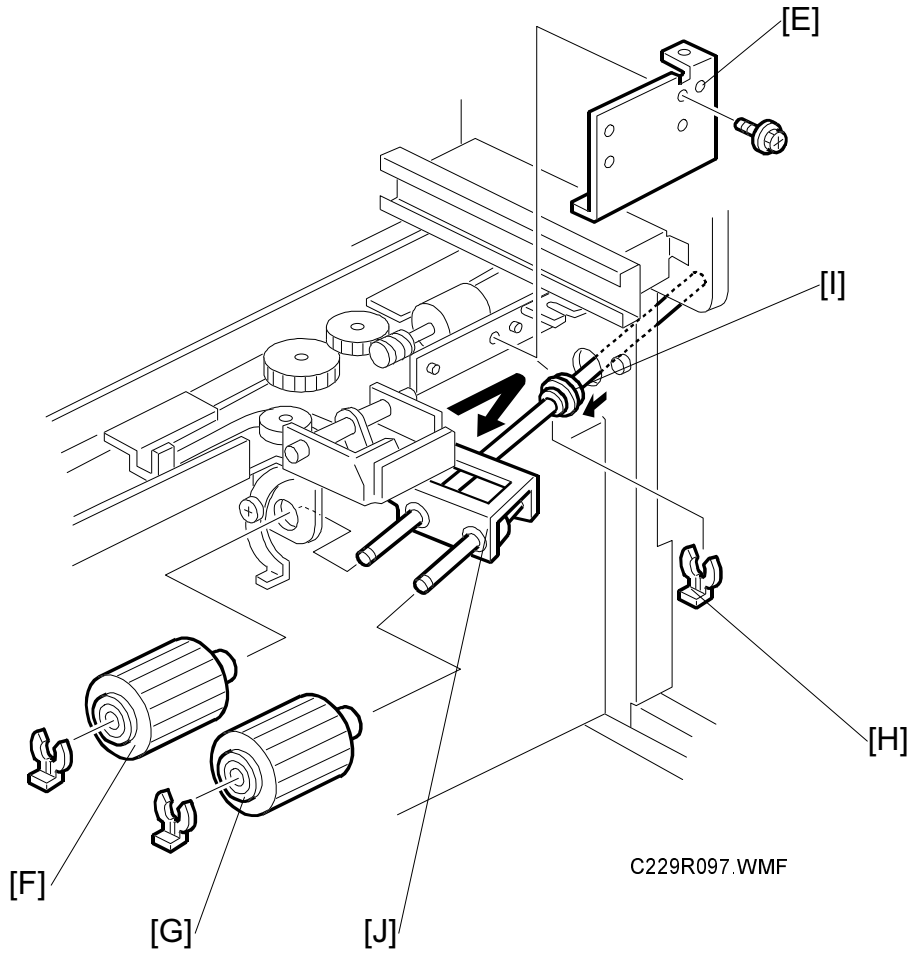
1. Remove the master making unit. (See 6.7.1 Master Making Unit Removal.)

   A: Feed cover (2 screws)

2. Swing out the MPU. (See 6.4 MPU and PSU Opening Procedures.)

   B: Pulley cover (1 screw)
   C: Paper feed motor (2 screws)
   D: Pulley (1 E-ring)

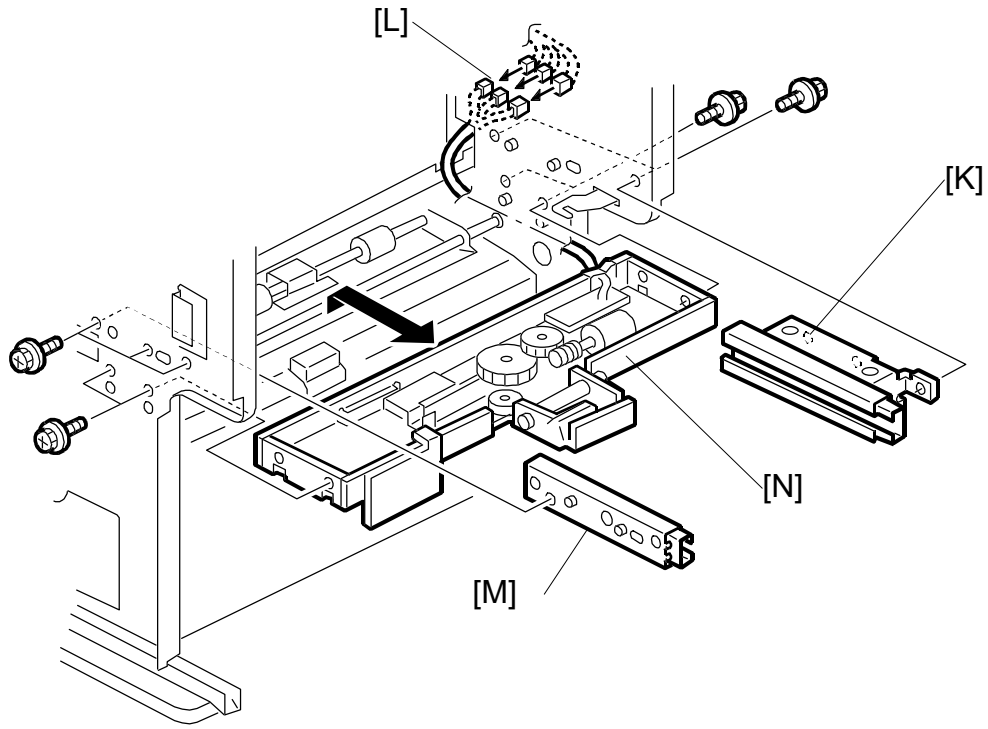
   NOTE: Do not lose the key [E] from the pulley.



3. E: Right paper guide plate (1 screw)
   F: Paper feed roller (1 clip)
   G: Pick-up roller (1 clip)

4. Remove the clips [H] and slide the bushing [I] towards the operation side.

   J: Paper feed roller unit

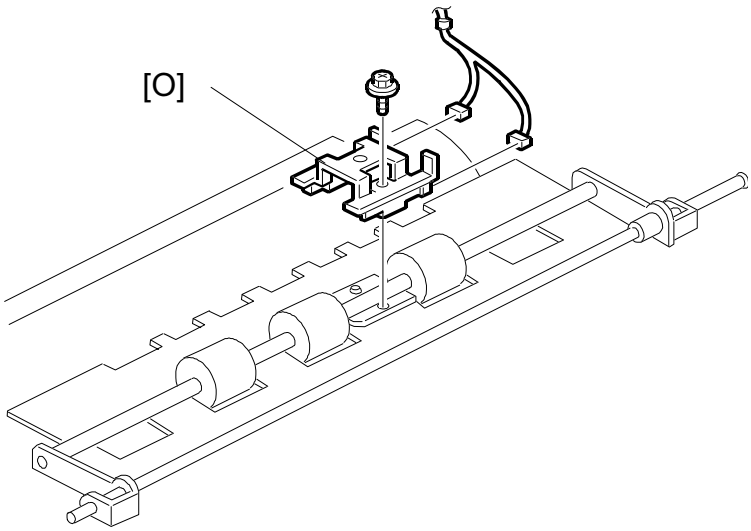


C229R098.WMF

5. K: Rear rail guide (2 screws)
   L: Connectors from the feed pressure detection board

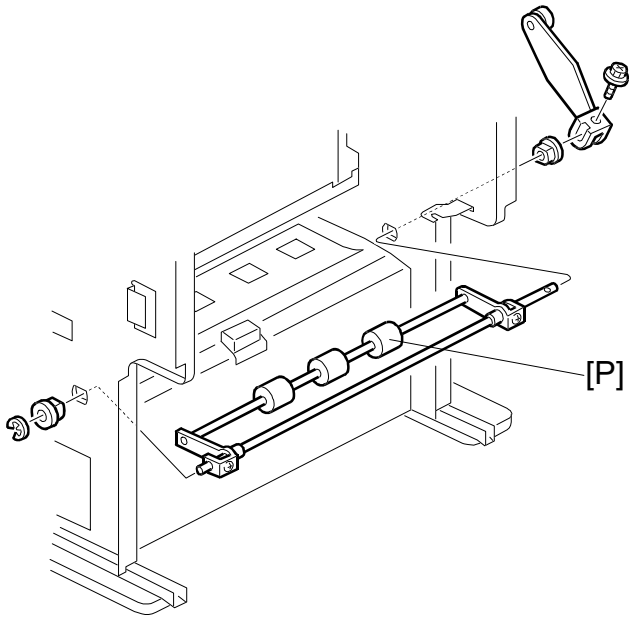
6. Remove the front exterior cover and inner cover.

   M: Front rail guide (2 screws)
   N: Feed pressure unit [C] (4 screws)



C229R036.WMF

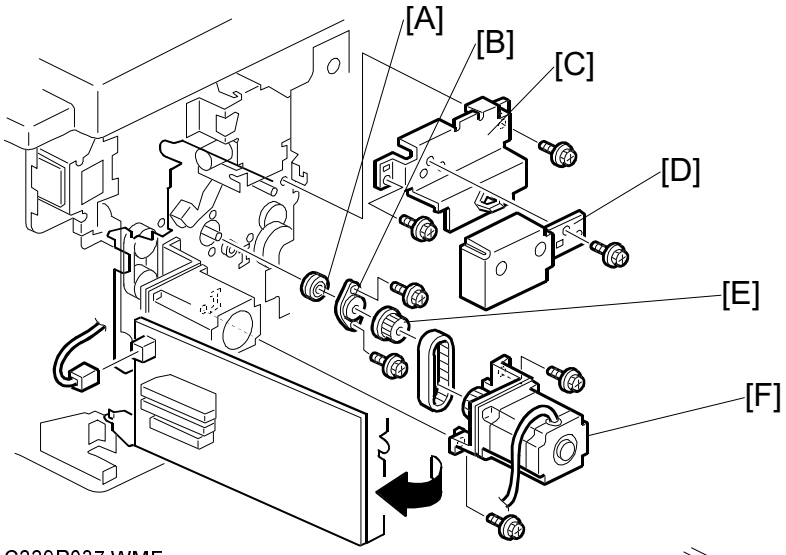
7. O: Sensor bracket (1 screw).
8. Remove the paper registration and feed timing sensors from the bracket.



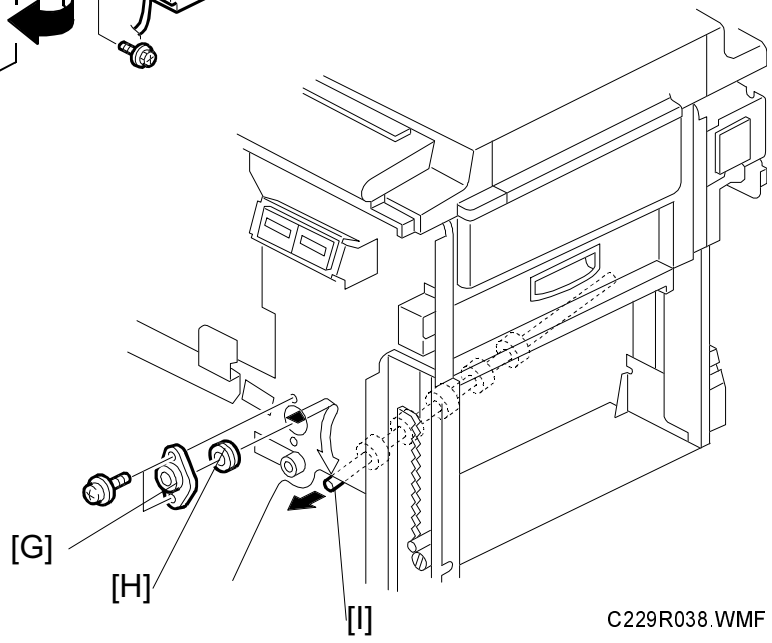
C229R527.WMF

9. P: Upper registration roller

6.9.7 LOWER REGISTRATION ROLLER



C229R037.WMF



C229R038.WMF

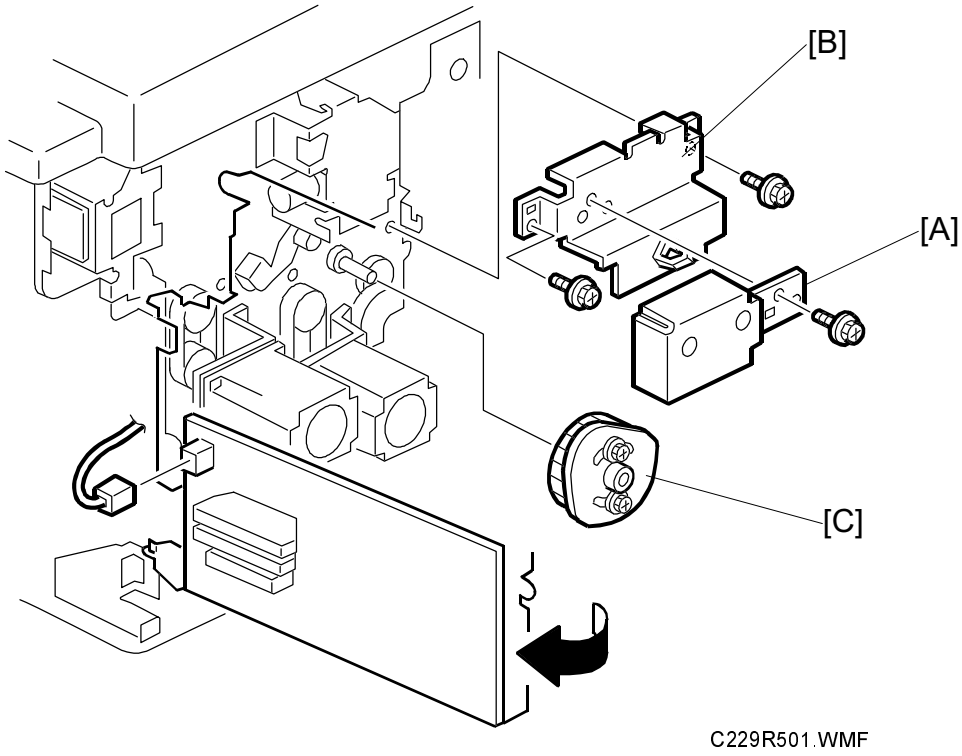
- From the rear -

1. Swing out the MPU. (See 6.4 MPU and PSU Opening Procedures.)
2. Remove the pulley cover [D] and the bracket [C] (3 screws, 7 connectors).
3. Remove the registration motor [F] (2 screws, 1 connector).
4. Remove the pulley [E] (2 Allen screws).
5. Remove the bearing holder [B] and the bearing [A] (2 screws).

-From the front -

6. Remove the front exterior cover (4 screws) and the inner cover (5 screws).
7. Remove the bearing holder [G] and the bearing [H] (2 screws).
8. Pull out the registration roller [I] towards the operation side.

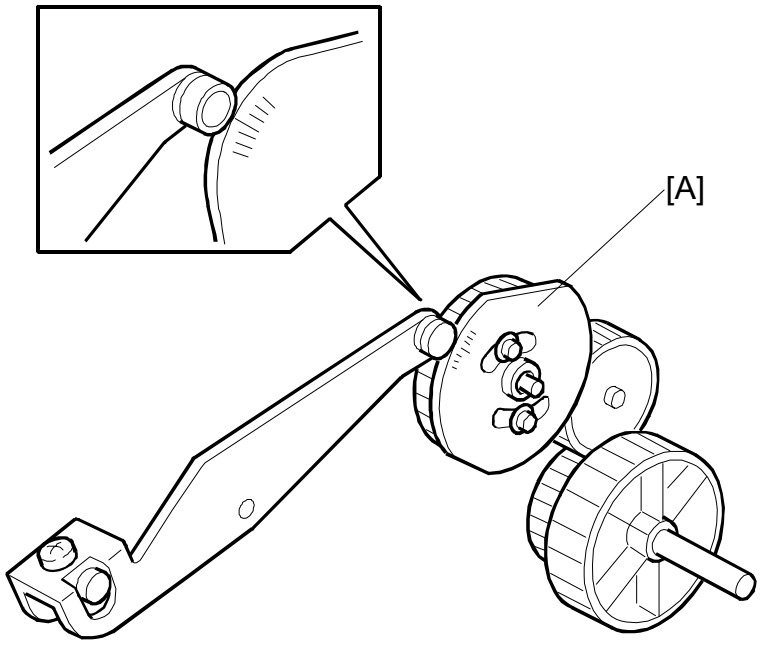
6.9.8 REGISTRATION ROLLER LIFTING CAM REMOVAL



1. Swing out the MPU. (See 6.4 MPU and PSU Opening Procedures.)
2. Remove the pulley cover [A] and the bracket [B] (3 screws, 7 connectors).
3. Remove the registration roller lifting cam [C].

CAUTION: There is the set position for the cam. When reinstalling the cam, follow Registration Roller Lifting Cam Position Adjustment on the next page.

6.9.9 REGISTRATION ROLLER LIFTING CAM POSITION ADJUSTMENT



C229R039.WMF

PURPOSE: To ensure smooth paper feed from the registration roller to the drum.

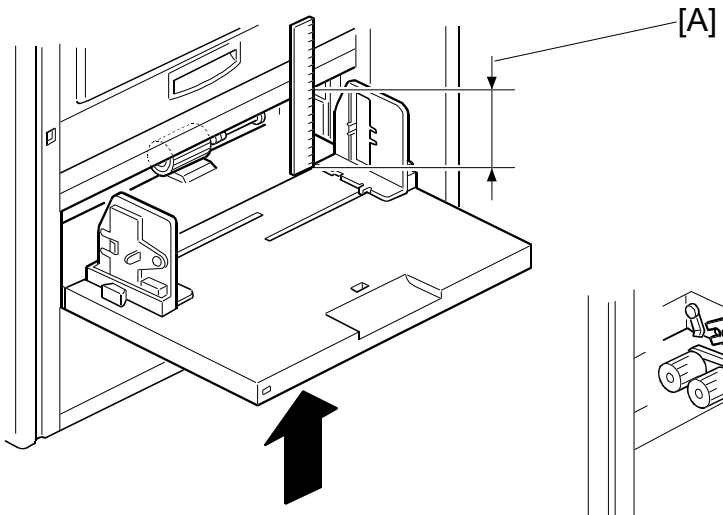
CAUTION: Make sure that the drum is at home position before the adjustment.

1. When installing the registration roller lifting cam [A] on the shaft, align the cam follower (a bushing) at the center or within two divisions to the right of the center.
2. If the cam follower cannot be put in the correct place, try to change the gear meshing. Also, try to readjust the position by loosening the screw holding the cam to the gear.

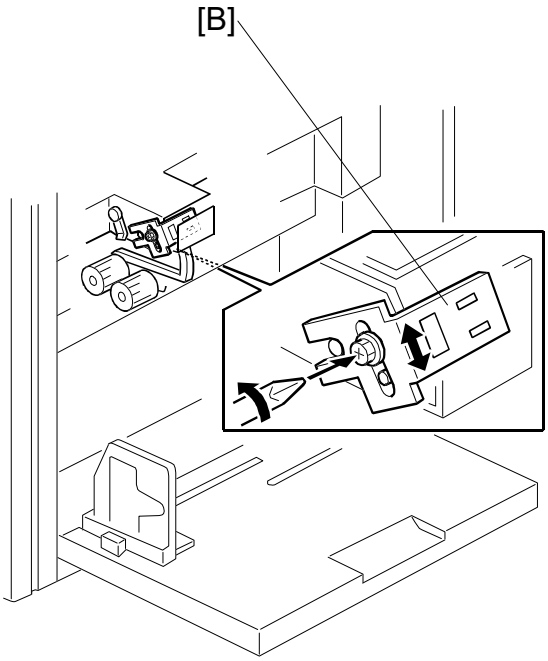
   NOTE: To obtain a perfect adjustment, you must take out any gear play by applying clockwise pressure to the cam (with the gear) during the adjustment.

6.9.10 PAPER TABLE HEIGHT ADJUSTMENT

PURPOSE: To ensure smooth paper feed



C229R080.WMF



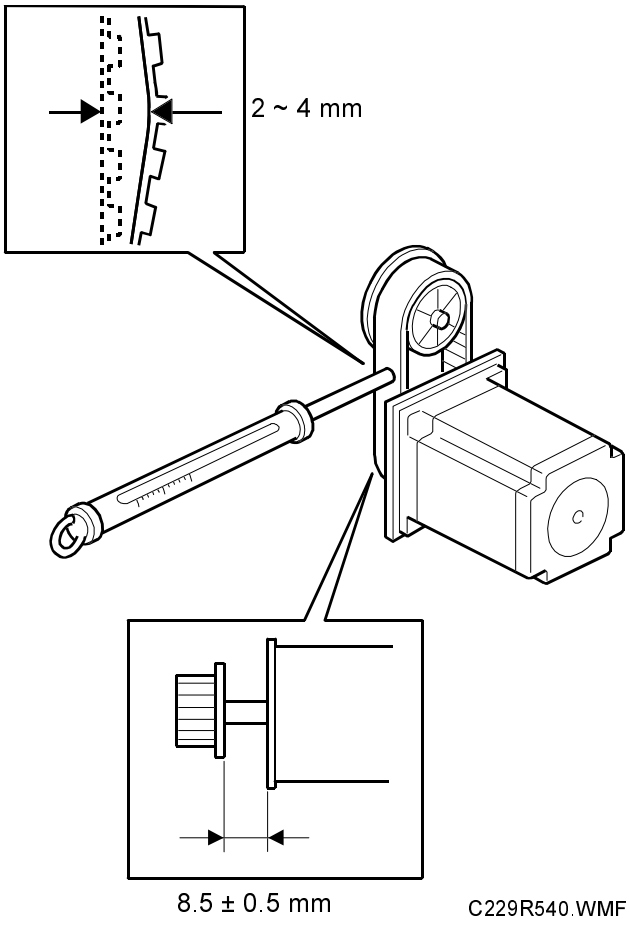
C229R514.WMF

1. Open the paper table. (There must be no paper.)
2. Turn on the main switch, then access SP 5-80-1 ("Paper Table Motor Up" in the output test mode).
3. In the SP mode, hold down the Start key to lift the paper table until it stops.
4. After the paper table stops, check if the distance [A] between the lower edge of the stay and the upper face of the table until it is 76.5 mm.
5. If the distance is not correct, adjust the upper limit position of the paper table by changing the paper height sensor position. To do this, loosen the screw and moves the sensor bracket [B] up or down.

NOTE: - To lower the stop position of the paper table: Moves the bracket down.
- To raise the stop position of the paper table: Moves the bracket up.

6.9.11 TIMING BELT TENSION ADJUSTMENT FOR THE PAPER FEED MOTOR

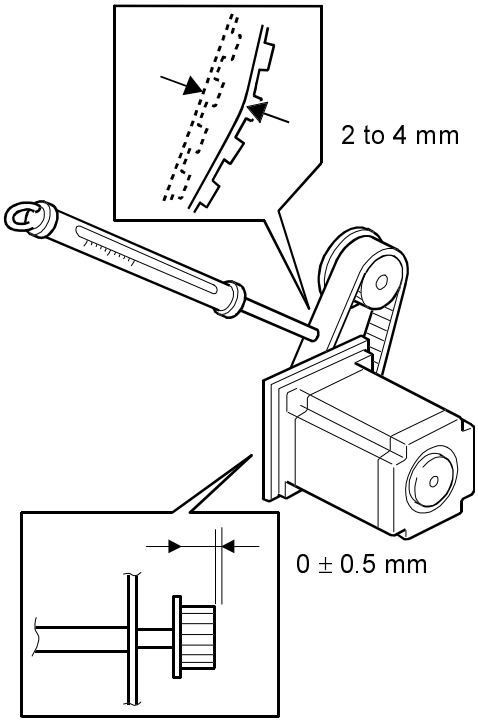
PURPOSE: To ensure smooth paper feed



1. Make sure that the distance between the motor and the flange is 8.5 ± 0.5 mm.
2. Apply a 500g load to the center of the belt using a tension gauge. Make sure that the belt deflects between 2 to 4 mm. If the tension is incorrect, move the motor up or down.

6.9.12 TIMING BELT TENSION ADJUSTMENT FOR THE REGISTRATION MOTOR

PURPOSE: To ensure smooth paper feed.



C229R539.WMF

1. Make sure that the distance between the end of the lower registration roller shaft and the edge of the pulley is 0 ± 0.5 mm.
2. Apply a 500g load to the center of the belt using a tension gauge. Make sure that the belt deflects between 2 to 4 mm. If the tension is incorrect, move the motor up or down.

6.9.13 PAPER FEED AND SEPARATION PRESSURE ADJUSTMENT

Paper feed pressure adjustment

PURPOSE: To ensure smooth paper feed from the paper table.

- The user has a choice of three different settings for the paper feed pressure (Standard, Frequent, Very Frequent). The user sets this between jobs depending on how often they think no-feed errors are occurring.
- The setting is returned to the default by pressing the Clear Modes key or turning the main switch off and back on. The default setting is “Standard”.
- The pressure applied for each setting can be adjusted by SP mode.

1. Select SP mode “6” (Adjustment mode).
2. Input “91” with the number keys, then press the Enter key.
   NOTE: SP90 is for special paper types (basically for envelopes), SP91 is for standard paper types, and SP92 is for thick paper. If the user has programmed as User 1 or User 2, you can change the paper feed pressures with SP93 and SP94.
3. Change the settings as necessary.
   - Defaults for SP91 – Standard: 3, Frequent: 5, Very Frequent: 6
   - The available pressure levels are from 0 to 6. (0 is the weakest, 6 is the strongest.)

Paper separation pressure adjustment

PURPOSE: To ensure paper separation.

- The user has a choice of three different settings for the separation pressure (Standard, Frequent, Very Frequent). The user sets this between jobs depending on how often they think multi-feed errors are occurring.
- The setting is returned to the default by pressing the Clear Modes key or turning the main switch off and back on. The default setting is “Standard”.
- The pressure applied for each setting can be adjusted by SP mode.

1. Select SP mode “6” (Adjustment mode).
2. Input “96” with the number keys, then press the Enter key.
   NOTE: SP95 is for special paper types, SP96 is for standard paper types, and SP97 is for thick paper. If the user has programmed as User 1 or User 2, you can change the paper feed pressures with SP98 and SP99.
3. Change the settings as necessary.
   - Defaults for SP96 – Standard: 2, Frequent: 4, Very Frequent: 6
   - The available pressure levels are from 0 to 6. (0 is the weakest, 6 is the strongest.)

6.9.14 PAPER FEED LENGTH ADJUSTMENT

Paper Feed Motor Stop Timing Adjustment

PURPOSE: To ensure that the paper reaches the registration roller properly. Changing the paper feed motor stop timing with SP6-116-3 changes the paper feed length for the paper feed roller.

CAUTION: Do not change SP6-110 and 6-111 (these change the paper feed start timing).

PROCEDURE:

1. Turn on the main switch, then access the SP mode.
2. Enter SP6-116-3.
3. Increase or decrease the value on the display.

NOTE: 1) Before changing the value, check the current setting, in case you need to recover the previous setting. (Default for SP6-116-3 – "25")
2) Changing the value by +1 increases the paper feed motor's on-time and feeds the paper an extra 0.3 mm.

4. Leave the SP mode, then check the paper feed performance. If the problem still occurs, repeat the above steps.

Paper Clamping Timing Adjustment

PURPOSE: To ensure that the paper reaches the paper clamper on the pressure cylinder properly. Changing the paper clamping timing with SP6-116-1 changes the paper feed length for the paper registration roller.

CAUTION: Do not change SP6-112 to 6-115 (these change the registration motor start timing). In addition, do not change SP6-116-2, -4, -6, or -7.

PROCEDURE:

1. Turn on the main switch, then access the SP mode.
2. Enter SP6-116-1.

   NOTE: The paper clamping timing depends on the paper type selected at the operation panel. SP6-116-1 is the adjustment for normal paper only. For thick paper, use SP6-116-5. (Note that in thick paper mode, paper clamping is not done.)

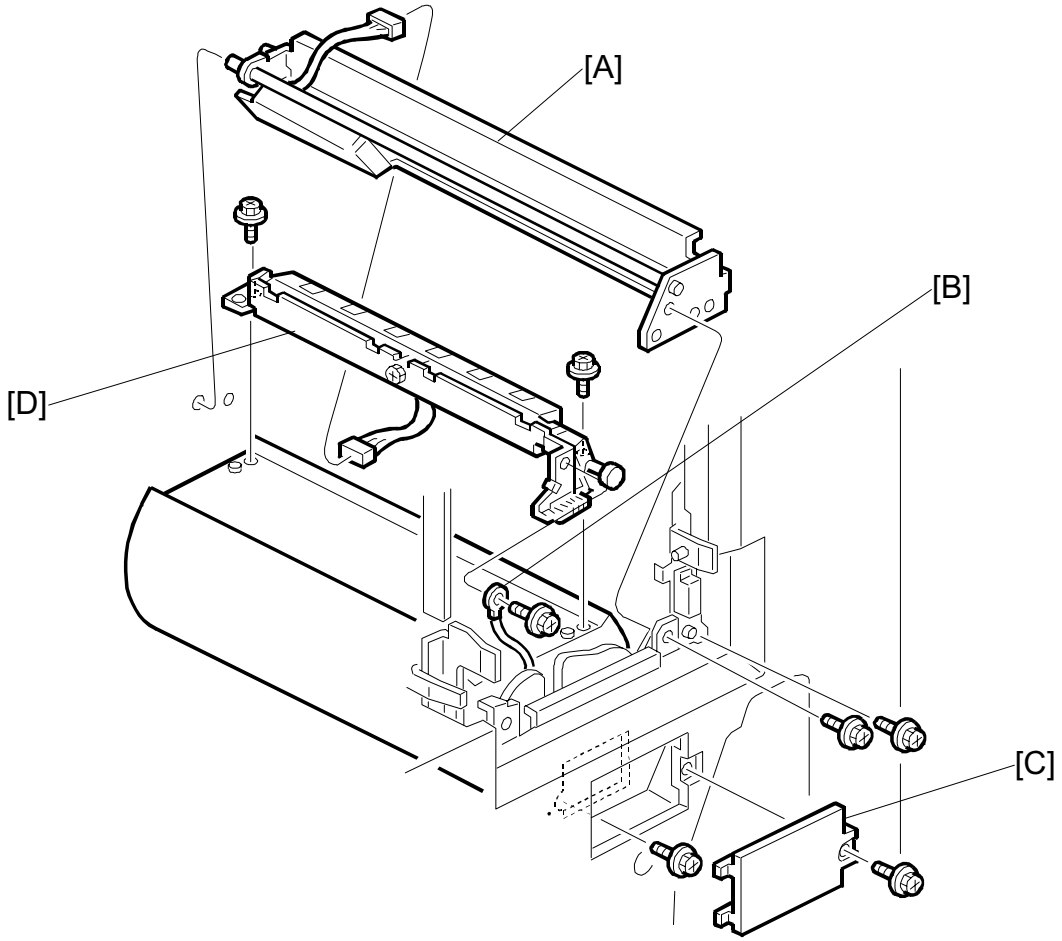
3. Increase or decrease the value on the display.

   NOTE: 1) Before changing the value, check the current setting, in case you need to recover the previous setting. (Default for SP6-116-1 – "143," for SP6-116-5 – "150")
   2) Changing the value by +1 decreases the registration motor's on-time and feeds the paper 0.3 mm less.

4. Leave the SP mode, then check the paper feed performance. If the problem still occurs, repeat the above steps.

6.10 PRINTING SECTION

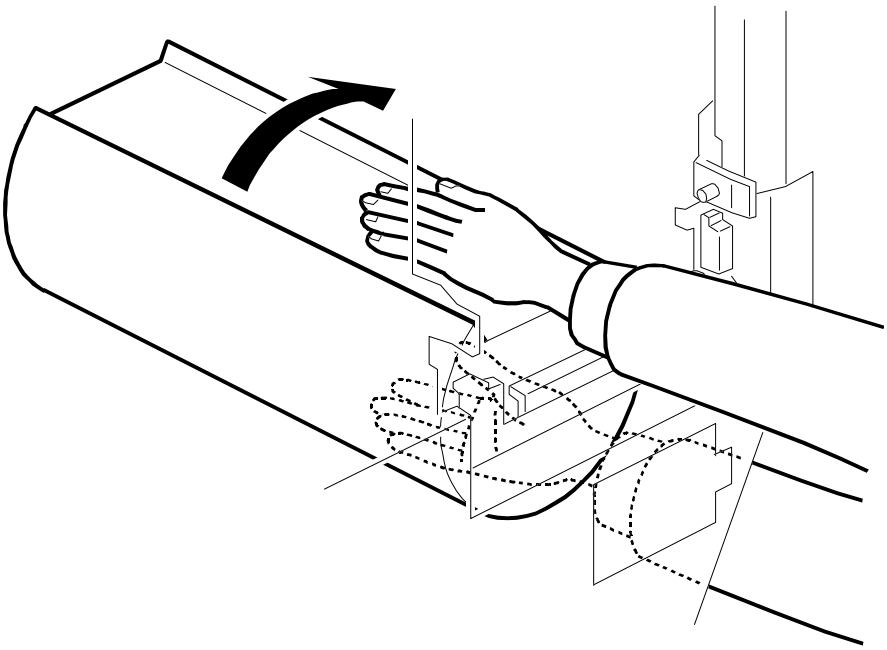
6.10.1 PRESSURE CYLINDER



NOTE: Take care when removing and replacing the pressure cylinder, because the pressure cylinder is made of soft rubber. Also, the encoder on the rear of the cylinder is easily damaged

Removal Procedure

1. Remove the drum.
2. Remove the bracket [A] (1 screw, 1 connector).
3. Remove the left exterior cover (5 screws).
4. Remove the paper delivery unit. (See "6.12.1 Paper Delivery Unit and Air Knife Fan Unit" section.)
5. Remove the exit pawl. (See "6.12.5 Paper Exit Pawl Removal" section.)
6. Remove the paper clamper [D] (2 screws, ground wire [B]).
7. Remove the blinding cover [C] from the inner cover (1 screw).



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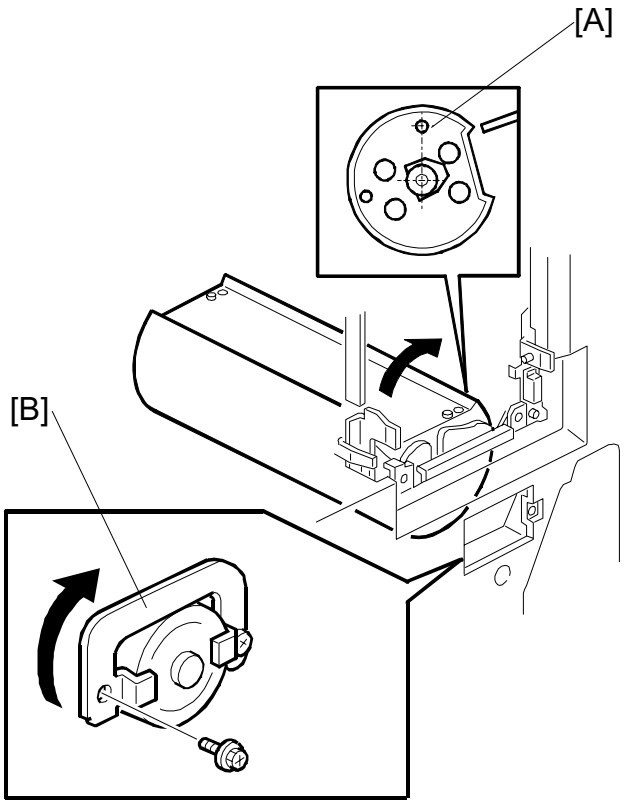
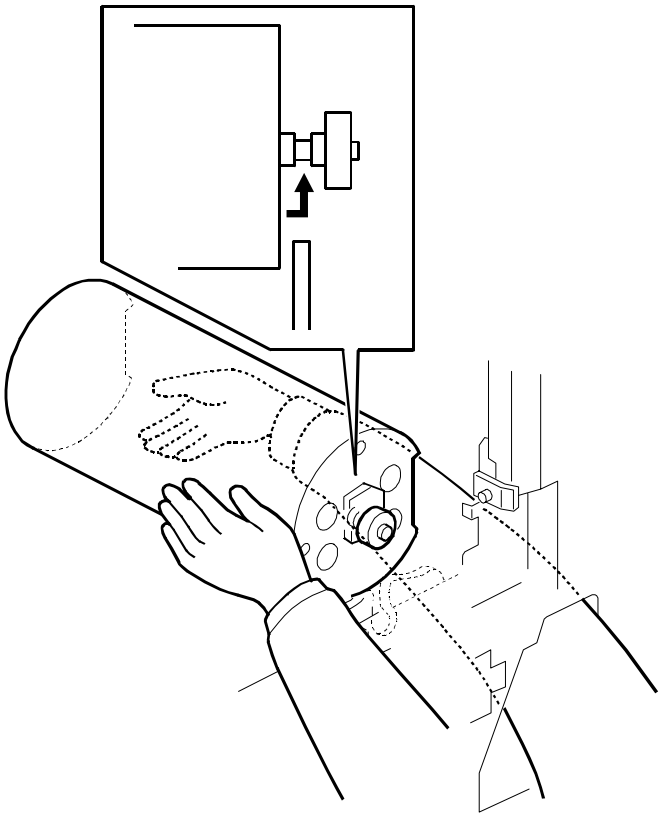
8. Turn the cylinder clockwise 80 degrees, so that the positioning hole [A] in the side of the cylinder is at the top. (The flat part of the cylinder faces the upper right side, as shown.)
9. Remove the screw and flip over the stopper [B].



C229R002.WMF

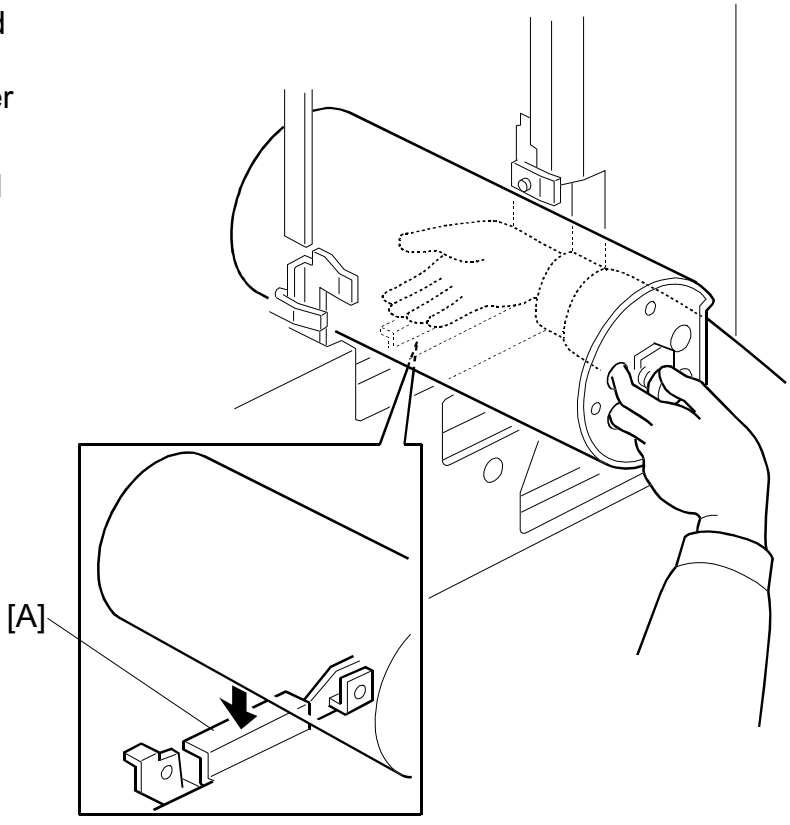
10. Put the right hand into the side trapezoid hole (for removing lower wrapping jams), and support the bottom of the cylinder.
11. Pull it a little toward you (to disengage the joint behind the cylinder). Then, push up to the drum position.

    CAUTION: There is the encoder plate at the rear of the cylinder. Be careful not to damage it when removing the cylinder.



C229R003.WMF

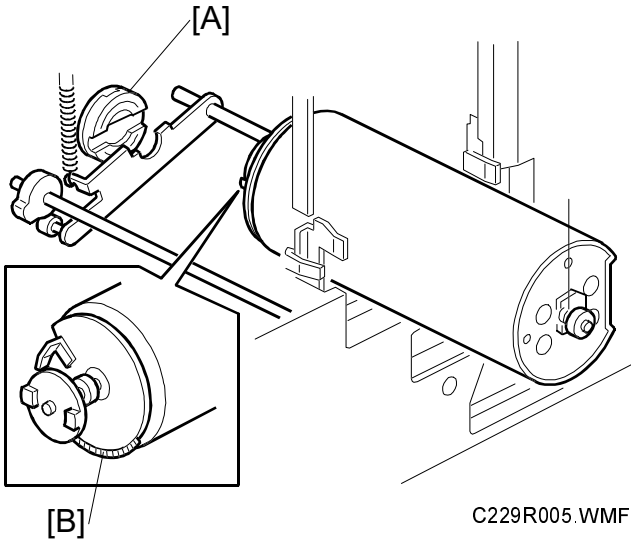
12. Pull the cylinder toward you, and rest put it on the flat area of the inner cover [A].
13. With the left hand, hold the bearing tightly, putting fingers into the holes as shown.
14. Support the rear of the pressure cylinder with the right hand. Then, bring out the cylinder using both hands.



C229R004.WMF

Reinstallation procedure

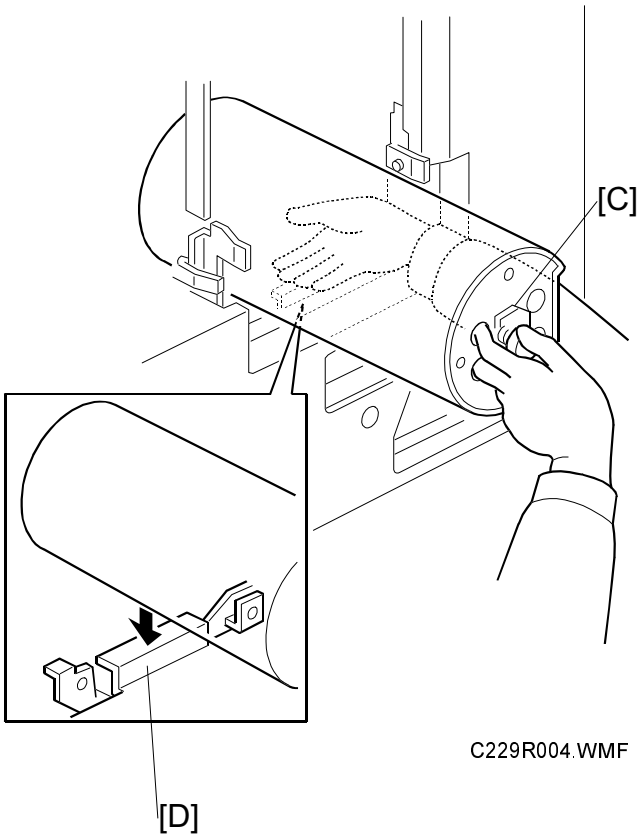
CAUTION: Take care not to turn the drive accidentally after removing the cylinder. When the drive is in position, the cutout (for engagement) in the drive conductor (white disk) [A] is positioned horizontally but leans to the upper right just slightly.



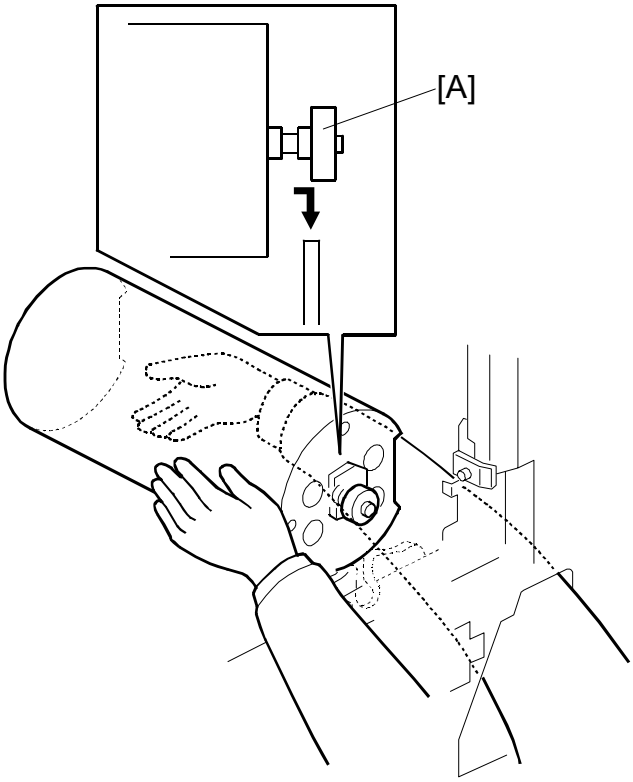
1. Hold the pressure cylinder so that the round hole [C] is uppermost. Rest the pressure cylinder on the flat area of the inner cover [D].

   CAUTION: There is an encoder plate [B] at the rear of the cylinder. Be careful not to damage it when installing the cylinder.

2. With the left hand, hold the bearing tightly, putting fingers into the holes as shown.
3. Support the rear of the pressure cylinder with the right hand. Put the right hand into the side trapezoid hole (for removing lower wrapping jams), and support the bottom of the cylinder.



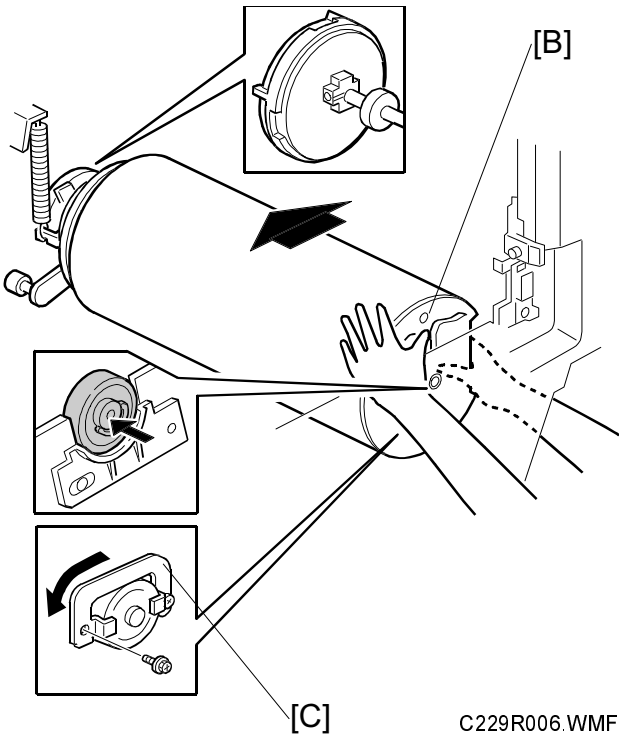
4. Then, put the pressure cylinder into the hole where the drum was using both hands.
5. Install the pressure cylinder, while positioning the thinnest part of the shaft of the bearing [A] with the clamper cam (the black cam) as shown to the right. Position the bearing [A] on the bearing holder.



C229R538.WMF

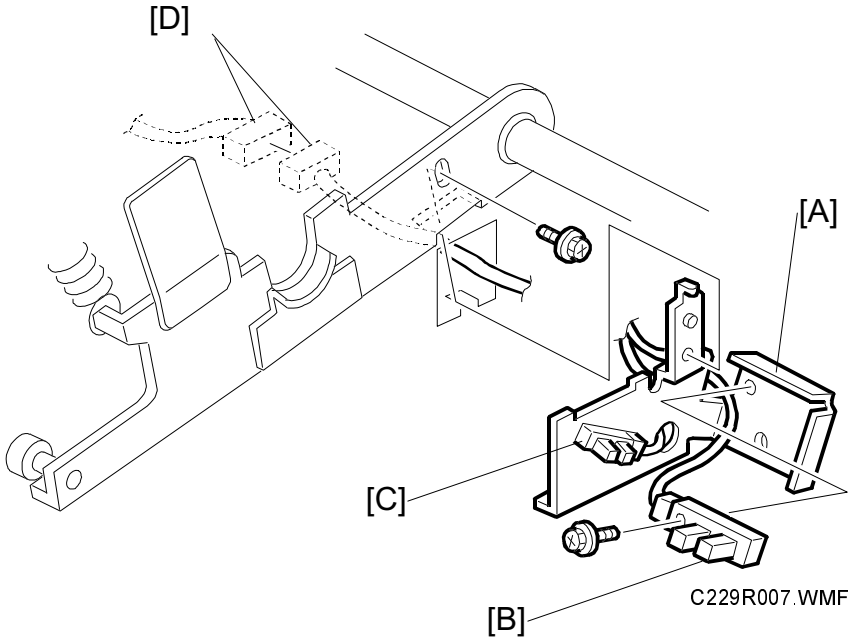
6. While the round hole [B] is uppermost, push the pressure cylinder towards the non-operation side (to engage the joint behind the cylinder).

NOTE: 1) If it cannot enter, push while turning the pressure cylinder a little. Check if the joint is engaged properly by turning the cylinder slightly.
2) Set the bearing stopper [C] as shown.



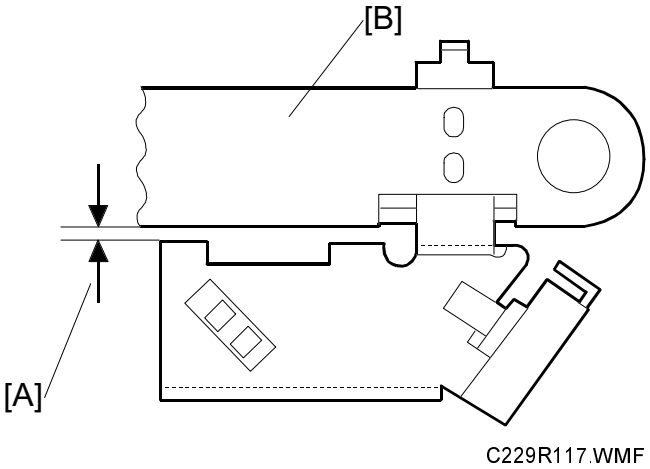
C229R006.WMF

6.10.2 FEED START SENSOR AND FEED ENCODER



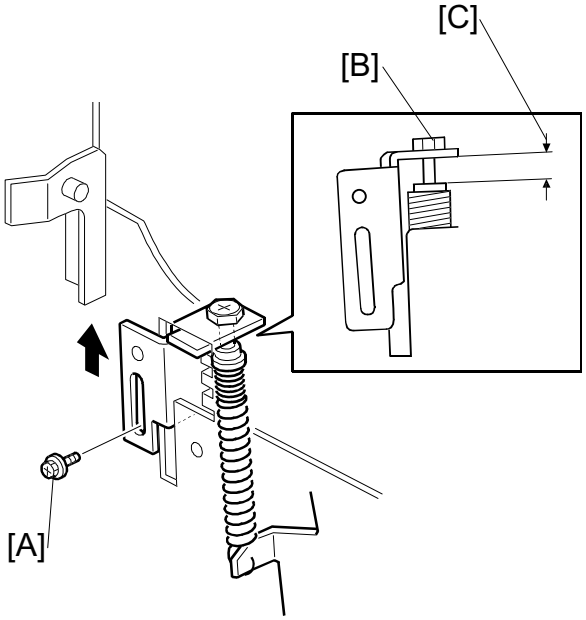
1. Fist, remove the pressure cylinder. (See 6.10.1 Pressure Cylinder section.)
2. From the rear of the machine, swing out the MPU. (See 6.4 MPU and PSU Opening Procedures.)
3. Disconnect the connectors [D] from the rear of the machine.
4. Remove the feed encoder [B] and feed start sensor [C].

CAUTION: Make sure if there is a gap [A] between the sensor bracket and the printing pressure release arm [B]. There must be no gap or less than 0.2 mm.



6.10.3 PRINTING PRESSURE ADJUSTMENT

PURPOSE: To improve the print results.

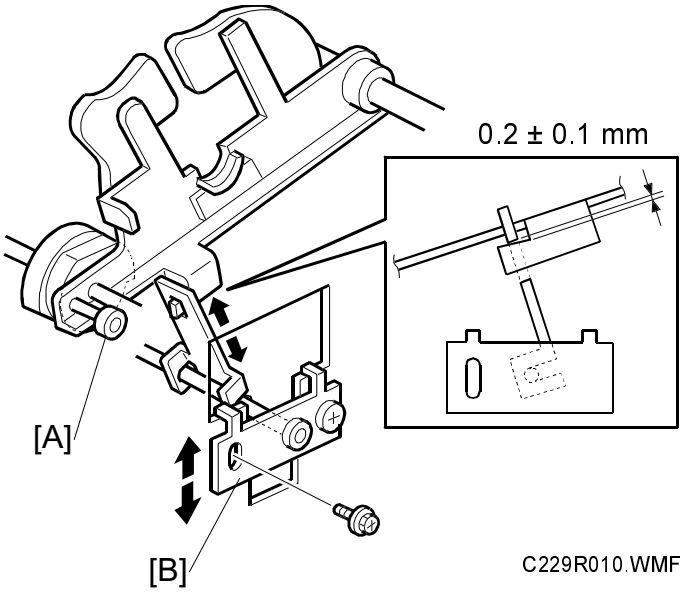


C229R009.WMF

1. Move the printing pressure bracket to its highest position, then tighten the screw [A].
2. Adjust the clearance [C] to be 6.6 ± 0.3 mm by turning the bolt [B].

6.10.4 PRINTING PRESSURE RELEASE ARM GAP ADJUSTMENT

PURPOSE: To ensure that printing pressure release lever is disengaged when the printing pressure release solenoid is energized.



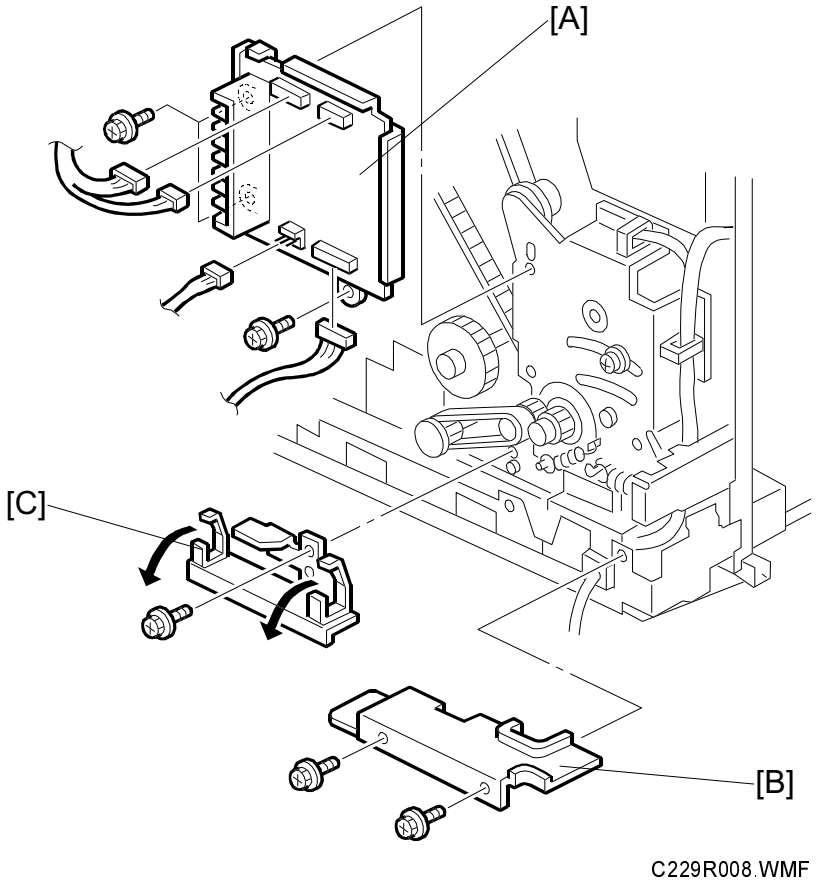
1. Rotate the printing pressure cams so that the arm moves to the lower most position.

   NOTE: Use the main drive rotation knob. When the top of the cam meets the bearing [A] during turning the knob, the arm is at to the lower most position.

2. Adjust the clearance between the hook and the printing pressure release arm by moving the bracket [B] up and down. The clearance must be 0.2 ± 0.1 mm.
3. Do the same at the non-operation side.

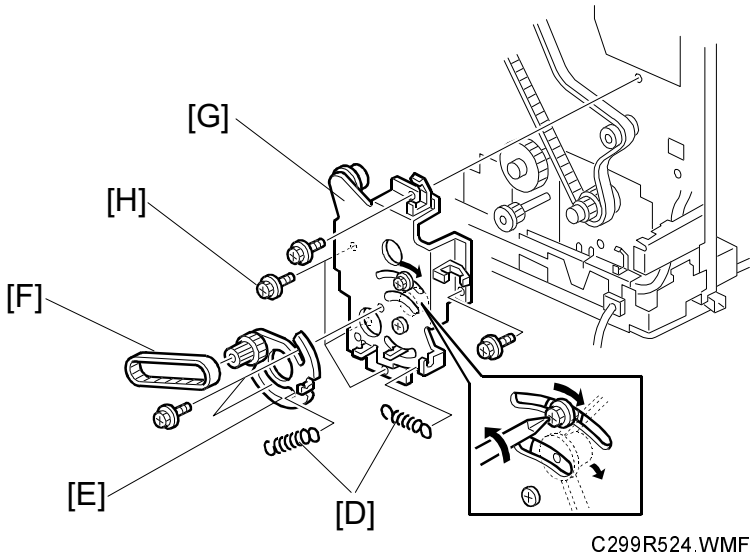
6.11 MAIN DRIVE AND IMAGE UP/DOWN SHIFTING DRIVE SECTION

6.11.1 MAIN MOTOR



- From the rear -

1. Turn off the main switch and remove the rear cover (6 screws, 1 ground wire).
2. Swing out the PSU. (See 6.4 MPU and PSU Opening Procedures.)
3. Remove the main motor control board [A] (3 screws, 4 connectors).
4. Remove the wire protection cover [B] (2 screws).
5. Remove the bracket [C] (1 screw).



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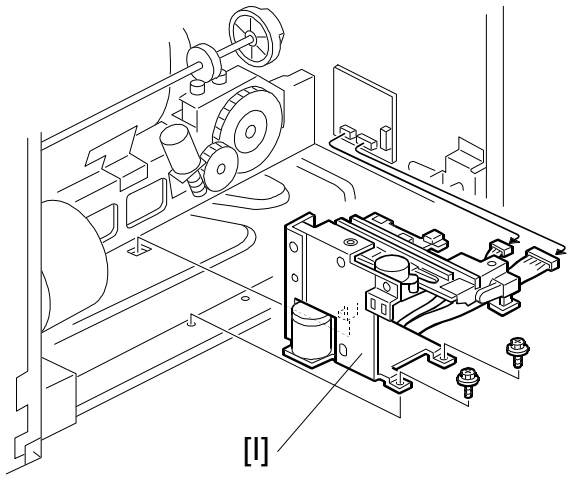
6. Remove the 2 springs [D].
7. Remove the pulley bracket [E] (2 screws).
8. Remove the timing belt [F].
9. Remove the bracket [G] (5 screws, 2 cord clamps).

CAUTION: Screw [H] is located under the main wire harness. Take care not to damage the wire harness when removing it.

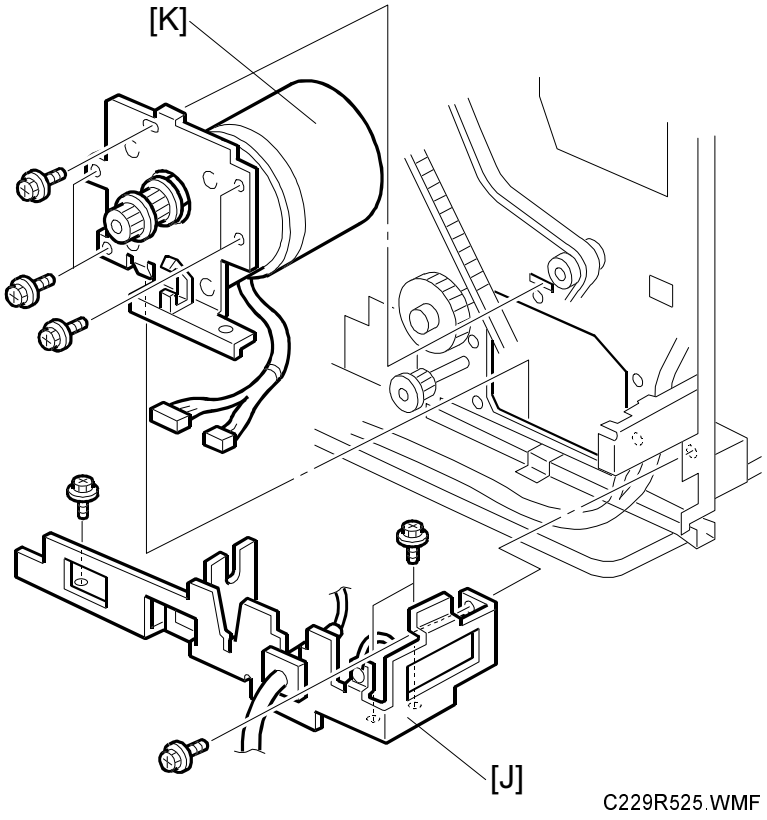


C229R522.WMF

- From the paper exit side -

10. Remove the paper delivery cover (4 screws).
11. Remove the job separator unit [I] (2 screws).

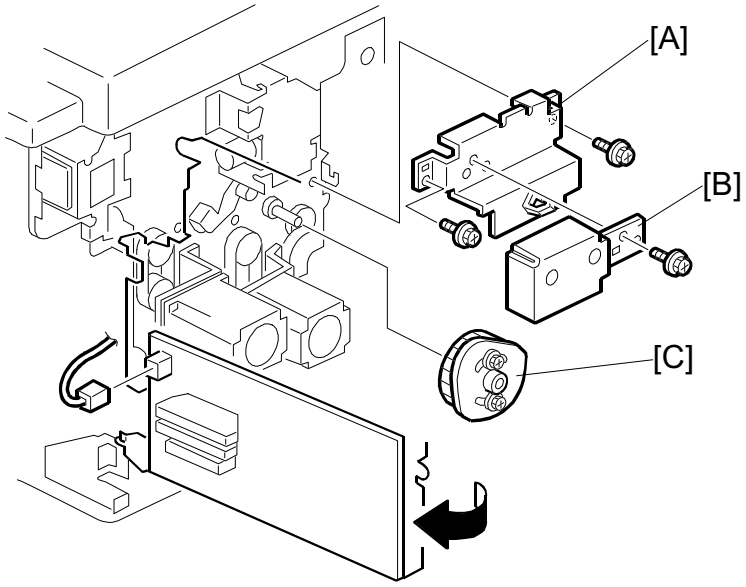
– Again, from the rear –



12. Remove the power cord bracket [J] (4 screws).
13. Remove the main motor [K] (5 screws).

CAUTION: After you replace the main motor, you must adjust the exit pawl drive timing. (See 6.12.7 Paper Exit Pawl Drive Timing Adjustment.)

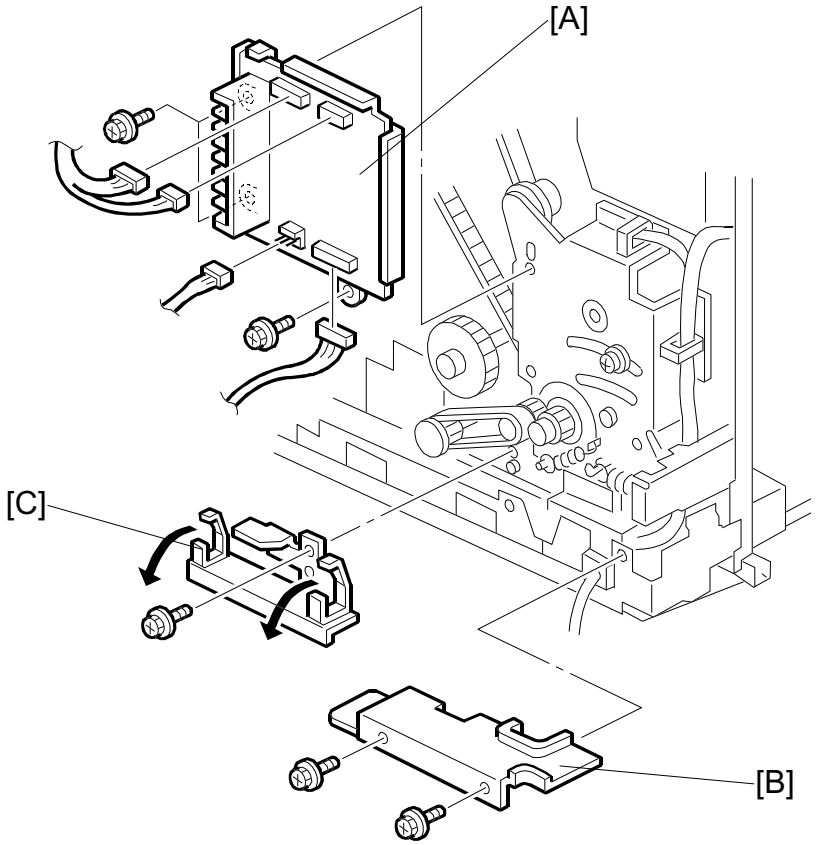
6.11.2 MAIN DRIVE MECHANISM (MAIN DRIVE TIMING BELT)



C229R501.WMF

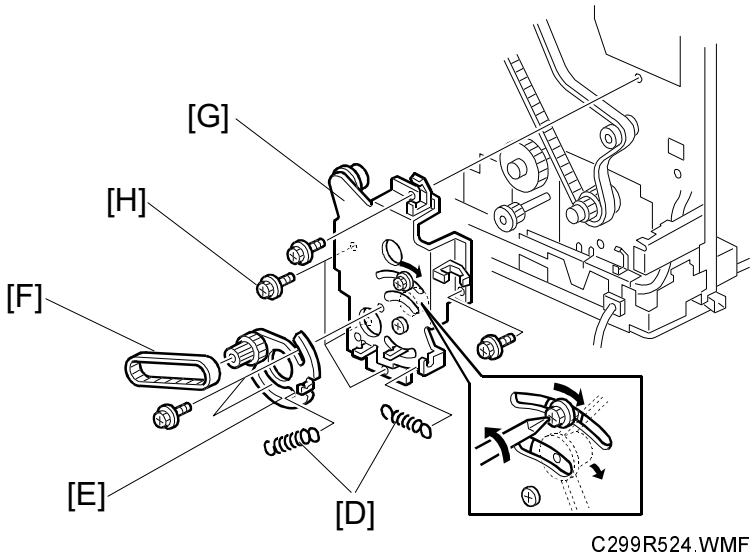
Disassembly Procedure

1. Turn off the main switch and disconnect the power plug.
2. Remove the drum.
3. Remove the rear exterior cover (6 screws, 1 ground wire).
4. Swing out the MPU and PSU. (See 6.4 MPU and PSU Opening Procedures.)
5. Remove the pulley cover [B] and the bracket [A].
6. Remove the registration roller lifting cam [C].



- From the rear -

7. Remove the main motor control board [A] (3 screws, 4 connectors).
8. Remove the wire protection cover [B] (2 screws).
9. Remove the bracket [C] (1 screw).



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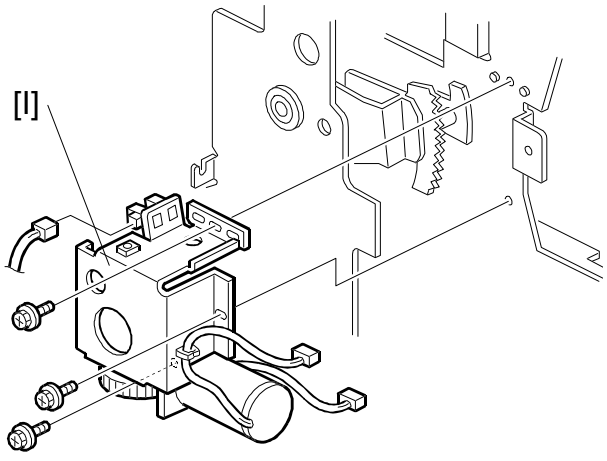
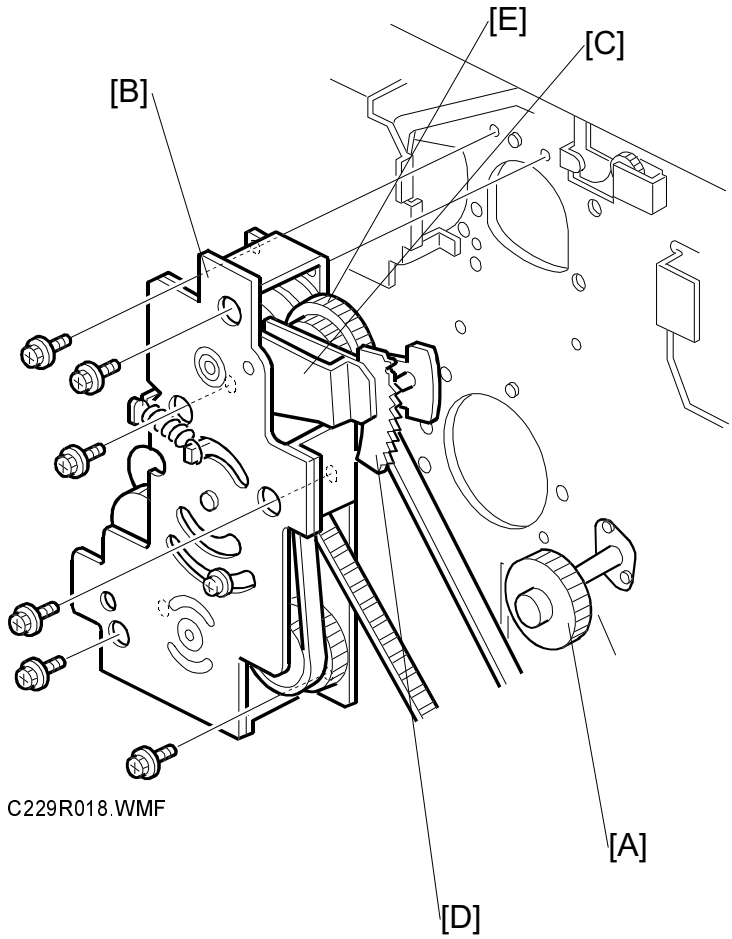
10. Remove the 2 springs [D].
11. Remove the pulley bracket [E] (2 screws).
12. Remove the timing belt [F].
13. Remove the bracket [G] (5 screws, 2 cord clamps).

CAUTION: Screw [H] is located under the main wire harness. Take care not to damage the wire harness when removing it.

14. Remove the image shifting unit [I] (3 screws, 3 connectors).



C229R019.WMF

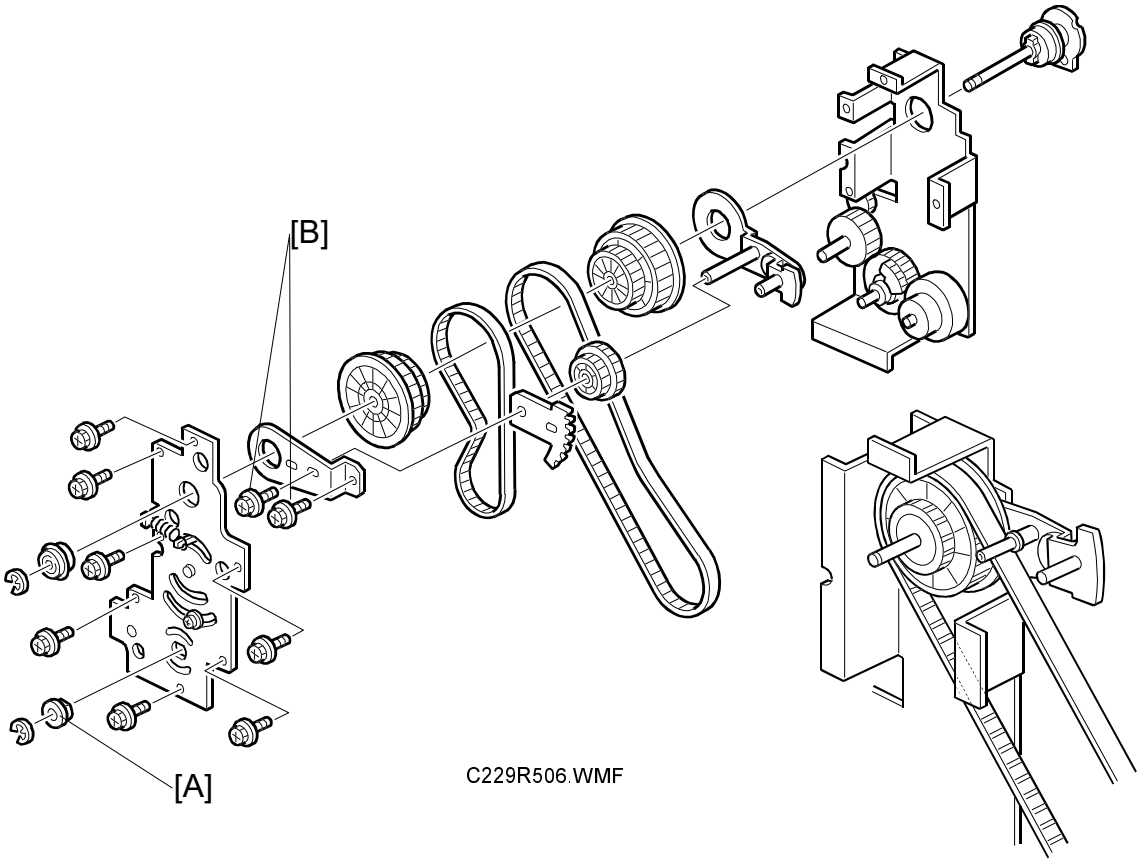


15. Remove the printing pressure cam drive gear [A] (2 screws).
16. Remove the supporter for PSU and MPU (4 screws).
17. Remove the drive unit [B] (6 screws, 1 cord clamp).
18. Disassemble the drive unit to remove the upper cover (2 E-rings, 2 bearings, 1 spring, 7 screws).
19. Remove the image shifting arm [C].
20. Remove the sector gear [D].
21. Remove the image shifting gear [E] and the drive gear.
22. Replace the main drive timing belt.

Reassembly Procedure

The following items must be checked or set while reinstalling the main drive section:

- Drum home position
- Image shifting arm home position
- Pressure cylinder drive reinstalling position
- Scissors gear reinstalling position
- Printing pressure cam drive gear reinstalling position
- Registration roller lifting cam reinstalling position
- Paper exit pawl drive cam reinstalling position
- Pressure cylinder rotation knob position



Assembling the main drive unit

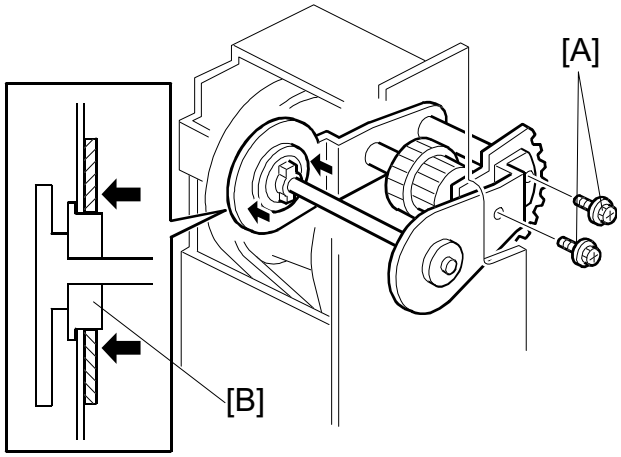
1. Reassemble the main drive unit (1 spring and 7 screws).

   NOTE: In this step, the bushing [A] (and the E-ring) must not be installed. Install these in step 9. In addition, do not install the two screws [B] securing the image shift arm. Install them in the next step.

2. Tighten the two screws [A] to assemble the image shift arm and image shift gear.

   NOTE: Install the two screws temporarily, since you must retighten them in step 5.

3. Make sure that the plate on the rear of the image shift arm is firmly set on the bearing sleeve [B] as shown.



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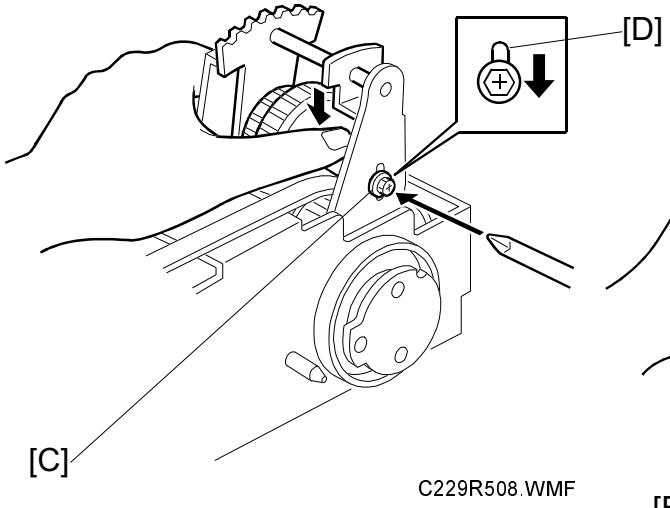
CAUTION: Once the two screws [A] are loosened, the rear plate of the image shift arm easily slips off the bearing sleeve. Make sure that the rear plate is on the bearing sleeve properly also before installing the main drive unit on the machine rear frame in step 13.



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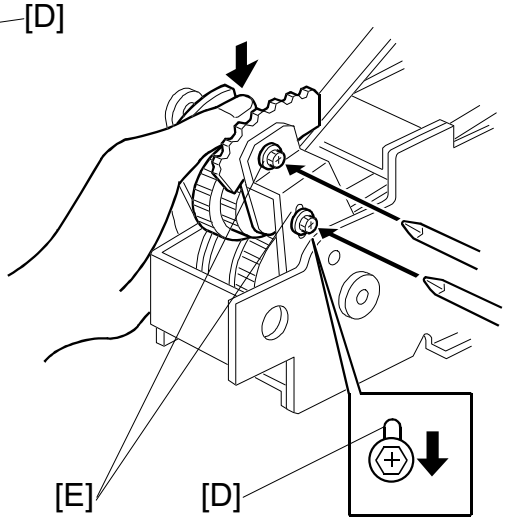

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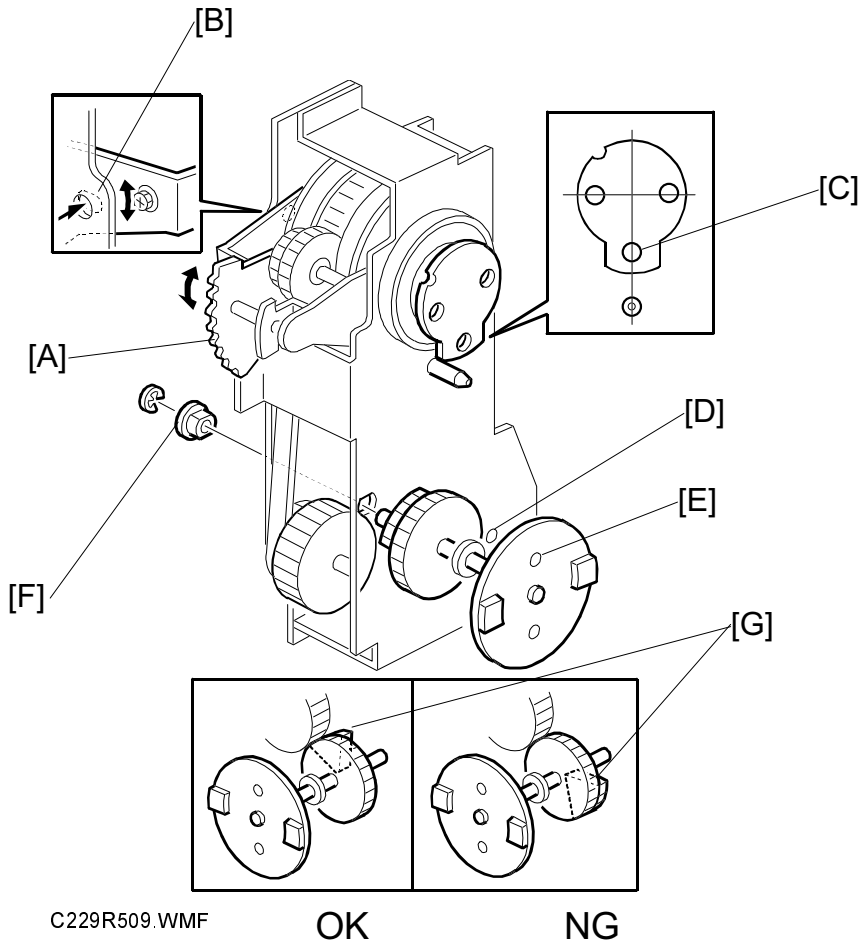
4. Strongly push the shaft of the image shift gear against the other gears, and firmly tighten the screw [C].
5. Similarly, tighten the two screws [E] while pushing the arm shaft against the other gears strongly.

NOTE: Step 4 and 5 are to remove play between the image shift gear and other gears. There must be no gear play between these gears. The screws are set through long holes [D]. Make sure that the screws reach the end of the long hole when tightening them.

6. Make sure that the image shift gear smoothly moves along the drum drive gear.



Setting the drum drive disk, image shifting arm, pressure cylinder drive disk, and scissors gear in their home positions

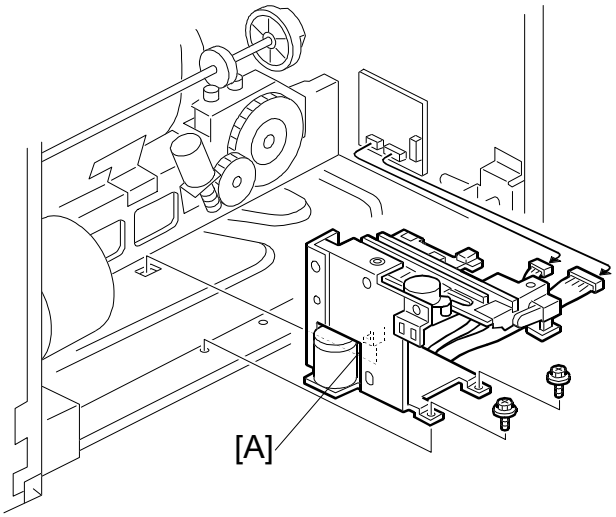
7. To set the drum drive disk in the home position, align the elongated hole [C] in the drum drive disk straight downwards by turning the disk.
8. Set the image shift arm [A] in the home position. Align the hole in the upper plate [B] with the elongated hole in the image shift arm.
9. Align the hole in the pressure cylinder drive disk [E] with the hole in the side plate of the drive unit [D], then install the bushing [F] (one E-ring).

NOTE: Before installing the bushing [F], make sure that the scissors gear [G] also meshes with the next gear. If the scissors gear is set incorrectly by 180 degrees, the scissors gear will not mesh with that gear. (See OK and NG in the diagram above.)

Installing the main drive unit on the machine rear frame

- From the paper exit side -

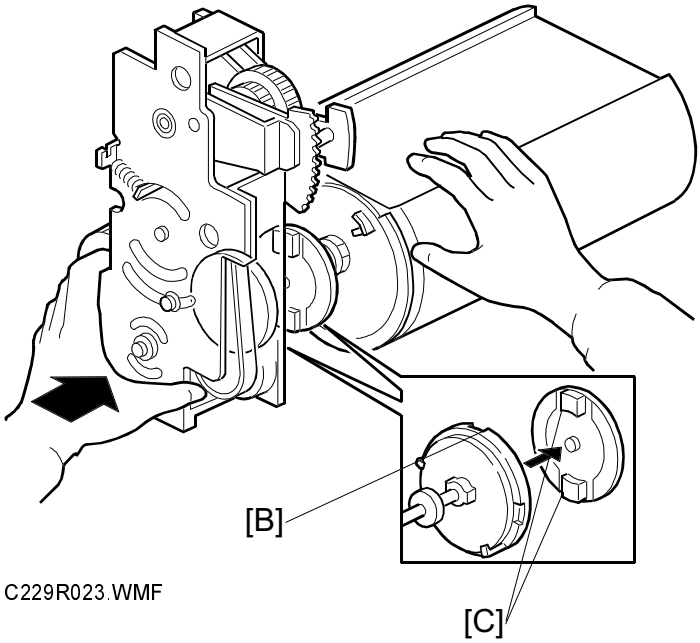
10. Remove the paper delivery unit and air knife unit. (See 6.12.1 Paper Delivery Unit and Air Knife Fan Unit.)
11. Remove the job separator unit [A] (2 screws).
12. Remove the paper exit pawl. (See 6.12.5 Paper Exit Pawl Removal.)



C229R522.WMF

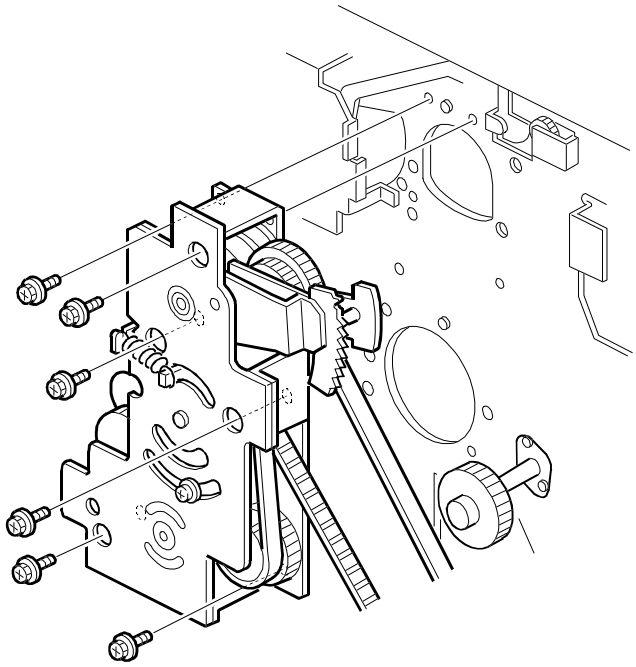
13. While aligning and holding the pressure cylinder horizontally as shown, set the main drive unit so that the convex points of the pressure cylinder's drive disk [C] meet the concave points of the pressure cylinder drive transmission disk [B] (made of white plastic).

NOTE: Hold the drum drive disk, image shifting arm, pressure cylinder drive disk, and scissors gear in their home positions as explained in step 7, 8, and 9. In addition, make sure that the rear plate is on the bearing sleeve properly as explained in step 3.



C229R023.WMF

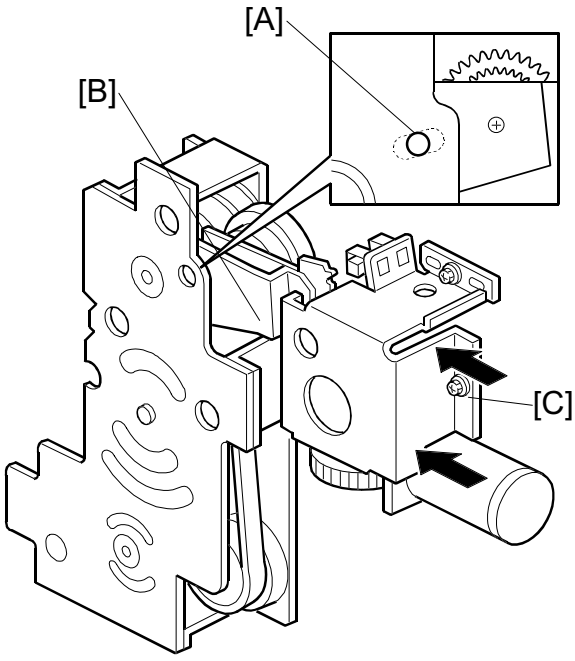
14. Secure the main drive unit on the machine rear frame (6 screws).



C229R018.WMF

15. Make sure that the image shift arm [B] is in the home position. Align the hole in the upper plate [A] with the elongated hole in the image shift arm (as explained in step 8).
16. Push the image up/down shift drive unit [C] against the image shift arm sector gear, and secure the unit (3 screws, 3 connectors).

NOTE: 1) Ensure that the unit is set without any play.
2) Do not push on the unit too strongly. Ensure that the image shift arm moves smoothly after securing the unit. If it does not, SC05-10 will be displayed at power up.



C229R024.WMF

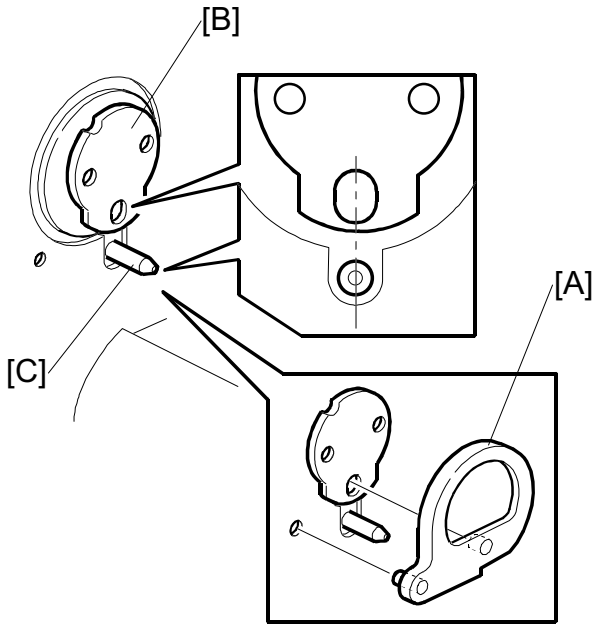
17. Install the main drive timing belt on the main motor shaft, and reassemble the parts of the main motor area. (Refer to steps 7 through 13 of the Disassembly procedure.)

Fine adjustment using the special tools

NOTE: The tools are available as a service part. The part number is #C229 9000 (three parts as a set).

18. Make sure that the drum drive disk is in the home position by setting the drum drive securing tool [A].

    NOTE: If the special tool is not available, align the elongated hole in the drum drive disk [B] with the shaft [C] below it, as shown.



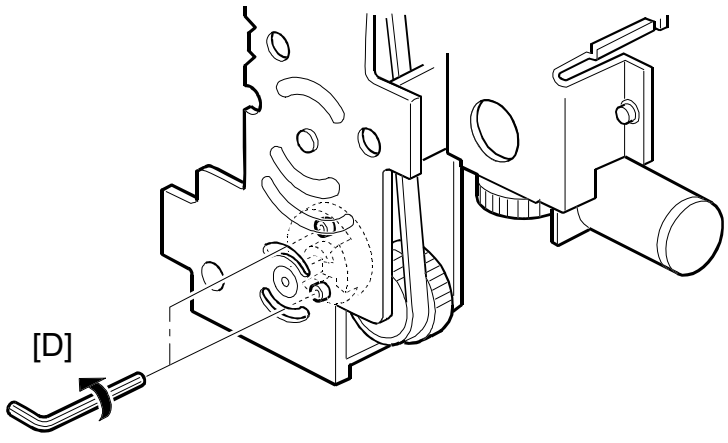
C229R081.WMF

19. Install the drum unit in the machine.
20. Close the front cover, connect the power plug, then turn on the main switch. The up/down image shifting mechanism will initialize.

    NOTE: This procedure is needed to return the image shift arm to its home position. If the image shift arm is not returned to home position exactly in this step, correct positioning for each main drive part will not be obtained.

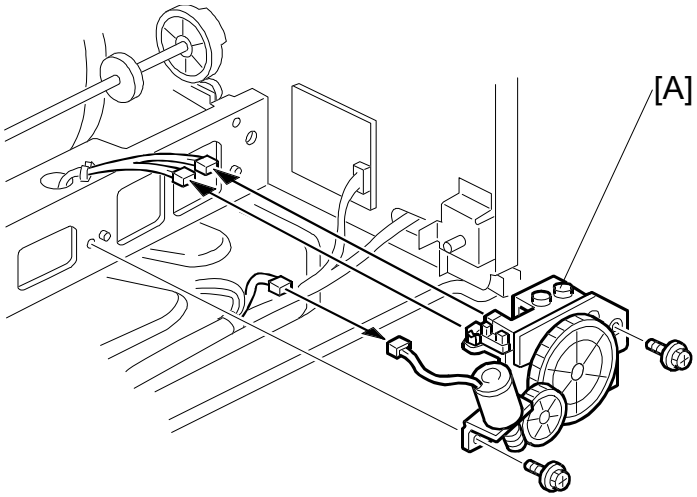
21. Turn off the main switch, and disconnect the power plug.
22. Remove the drum and again set the drum drive-securing tool [A].
23. From the rear, loosen the two screws [D] to allow the pressure cylinder drive gear to turn freely.

    NOTE: Do not remove the screws.

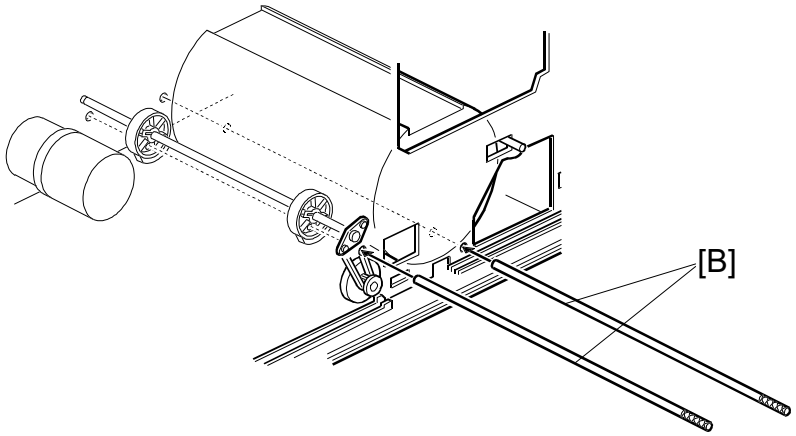


C229R025.WMF

24. Remove the printing pressure cam shift unit [A].
25. Remove the front exterior and inner covers (4 screws each).



C229R507.WMF

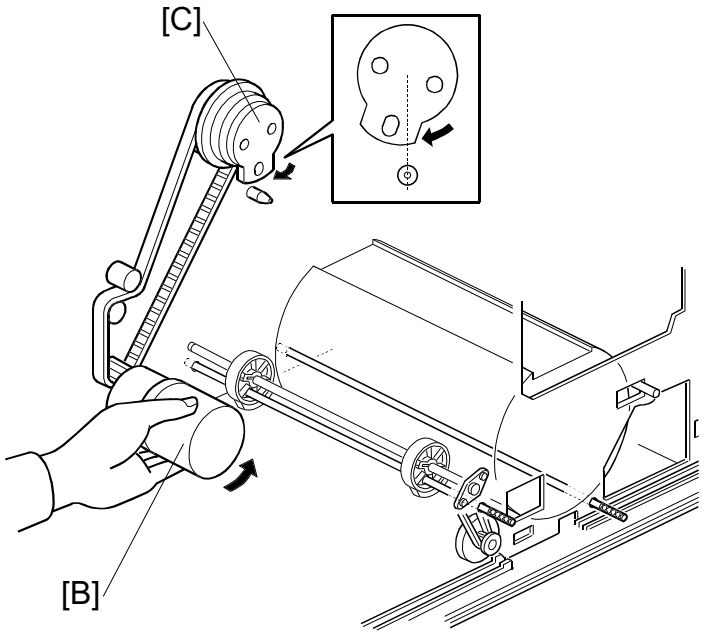


C229R026.WMF

26. From the operation side of the machine, insert the two positioning shafts [B] (special tools) to secure the pressure cylinder and printing pressure cams in their home positions.
    - Pass one shaft through the pressure cylinder as shown.
    - Pass the other shaft through the two printing pressure cams as shown.

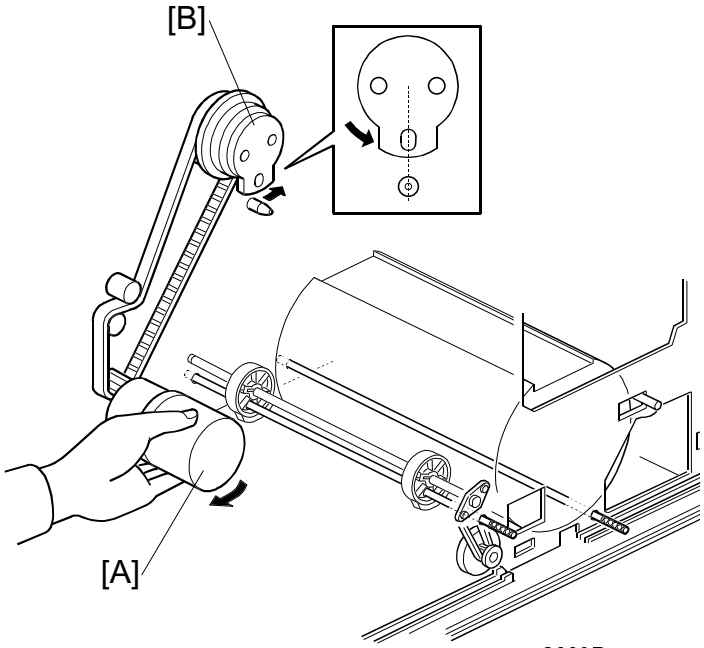
27. Remove only the drum drive-securing tool (leave the two positioning shafts). Then turn the main motor [B] counterclockwise by hand until the drum drive disk [C] has turned about 10 degrees, as shown.

    NOTE: Although the motor will not turn smoothly since the drive is secured with the special tools, this is normal.



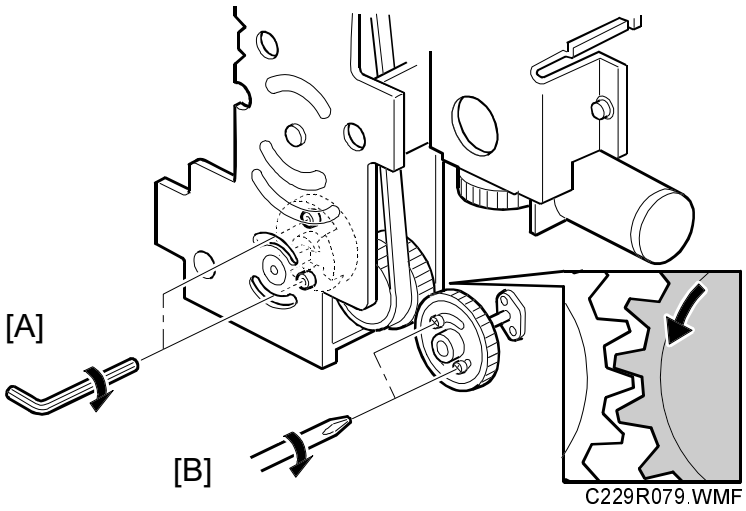
C229R535.WMF

28. Turn the main motor [A] clockwise, and set the drum drive disk [B] in the home position. (If the disk is turned too much at this point, reset from step 26.)



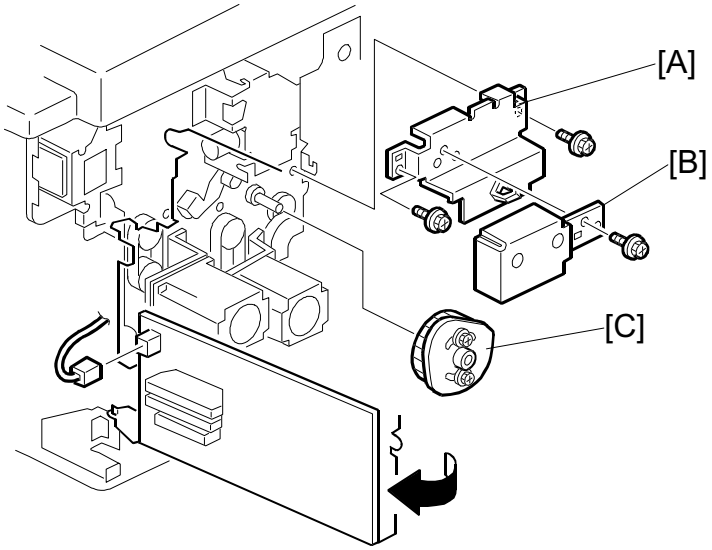
C229R536.WMF

CAUTION: These steps are needed to put gear play in the direction opposite to the printing direction. Make sure to turn the main motor by hand in the above order (steps 27 and 28). If the motor is turned in wrong order, the main drive will turn slightly when the two shafts (special tools) are removed. If you turned it in the wrong order, return to step 27 then do step 28.



29. Set the drum drive-securing tool once again. (See step 18.)
    CAUTION: Do not turn the drum drive disk by force while setting the tool. If you turned the disk, return to step 27 then do step 28.
30. Secure the pressure cylinder drive gear [A] (2 screws).
    CAUTION: Don't turn the gear by force while securing it.
31. Install the printing pressure cam drive gear and firmly tighten the 2 screws [B].

    NOTE: 1) To remove gear play, secure the cam drive gear while turning it counterclockwise (as viewed from the rear).
    2) Secure the cam drive gear by tightening the two screws in the middle of the curved oval holes. This allows for the maximum adjustable range for later repositioning of the gear.



C229R501.WMF

Finishing

32. Install the registration roller lifting cam [C]. (See 6.9.9 Registration Roller Lifting Cam Position Adjustment for the correct position of the cam.)
33. Install the pulley cover [B] and bracket [A].
34. Install the exit pawl, and adjust the paper exit pawl drive timing. (See 6.12.7 Paper Exit Pawl Drive Timing Adjustment.)
35. Adjust the pressure cylinder rotation knob. (See 6.11.3 Pressure Cylinder Rotation Knob Adjustment.)
36. Remove all special tools (the drum drive-securing tool and two positioning shafts).
37. Adjust the gap between the exit pawl and the drum. Also adjust the gap between the paper scraper and the pressure cylinder. (See 6.12.6 Gap Adjustment between Paper Pick-off Plate and Pressure Cylinder and 6.12.8 Gap Adjustment between Exit Pawl and Drum.)

Copy Image Check Procedure after Main Drive and Image Up/Down Shifting Drive Section Re-assembly

When the main drive mechanism is disassembled and assembled, the image position on copies may fluctuate due to play in the drive components.

Whenever you disassemble the main drive mechanism, you must check the following items for the copy quality:

When the image position on copies is not constant

- Check the pressure cylinder position.
  Use the positioning shaft (a special tool) to check if the position of the pressure cylinder is correct. See steps 26 through 30 in "Reassembly Procedure" of 6.11.2 Main Drive Mechanism (Main Drive Timing Belt).

When the leading edge margin of copies (10 mm) is not constant

- Check the position of the printing pressure cams.
  Use the positioning shaft (a special tool) to check if the cam position is correct. See steps 26 through 31 in "Reassembly Procedure" of 6.11.2 Main Drive Mechanism (Main Drive Timing Belt).
- Check if you followed steps 18 through 21 in "Reassembly Procedure" of 6.11.2 Main Drive Mechanism (Main Drive Timing Belt).

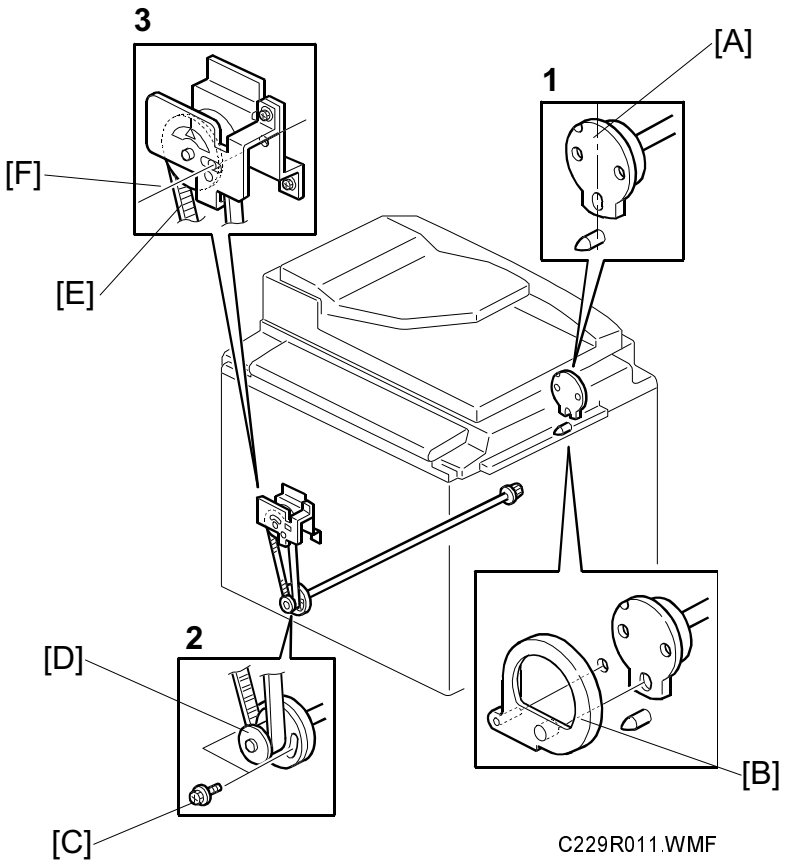
Other procedures if copy image problems are still detected

- Check the image up/down shift drive unit position.
  See 6.11.6 Image Up/Down Shift Drive Unit Position Adjustment. Also, see 6.11.5 Image Up/Down Shift Worm-gear Position Adjustment.

- Check the image shift gear play.
  See steps 2 through 6 in "Reassembly Procedure" of 6.11.2 Main Drive Mechanism (Main Drive Timing Belt).

- Check the scissors gear position.
  See step 9 in "Reassembly Procedure" of 6.11.2 Main Drive Mechanism (Main Drive Timing Belt). Also, see 6.11.4 Scissors Gear Position Adjustment.

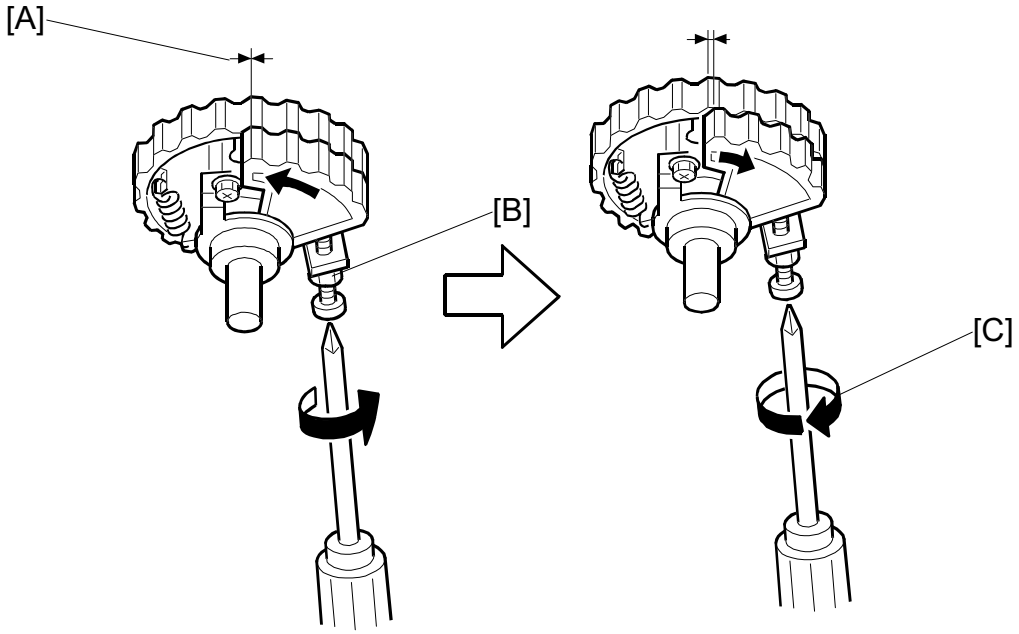
6.11.3 PRESSURE CYLINDER ROTATION KNOB ADJUSTMENT



1. Set the drum drive securing tool [B] (a special tool) as shown to hold the drum drive at home position.
   NOTE: If the special tool is not available, align the long hole of the drum drive disk [A] exactly with the shaft below it.
2. Loosen two screws [C] so that the pulley [D] freely turns.
3. Turn the timing belt [E] by hand until the triangle mark on the indicator disk meets the center division. (When the indicator disk is in the correct position, the hole in the disk and the two holes in the bracket are in line, as shown [F].
4. Retighten the two screws [C] to secure the pulley in position.

6.11.4 SCISSORS GEAR POSITION ADJUSTMENT

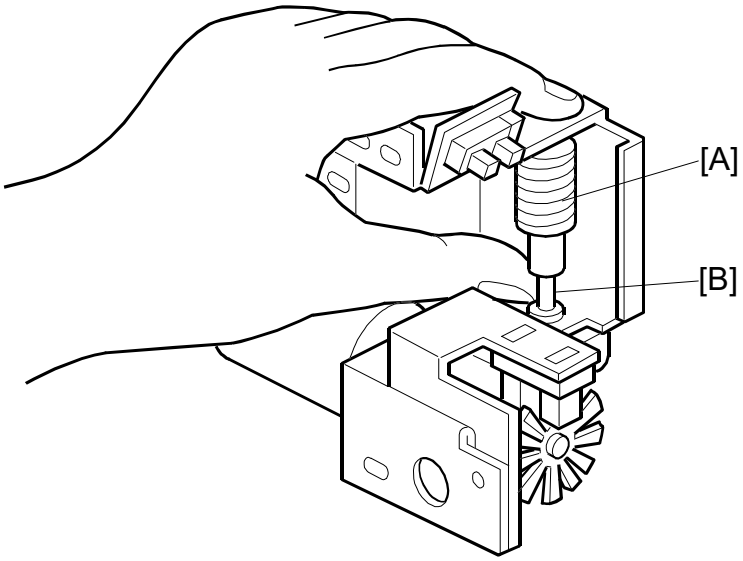
PURPOSE: If the position of the scissors gear is not correct, the paper feed registration will vary.



C229R505.WMF

1. Loosen the lock nut [B].
2. Tighten the screw, so that the gear meshes on both gears are aligned as shown [A].
3. Turn the screw fully counterclockwise circle to loosen it, as shown [C].
4. Holding the screw, tighten the lock nut [B].

6.11.5 IMAGE UP/DOWN SHIFT WORM-GEAR POTISION ADJUSTMENT

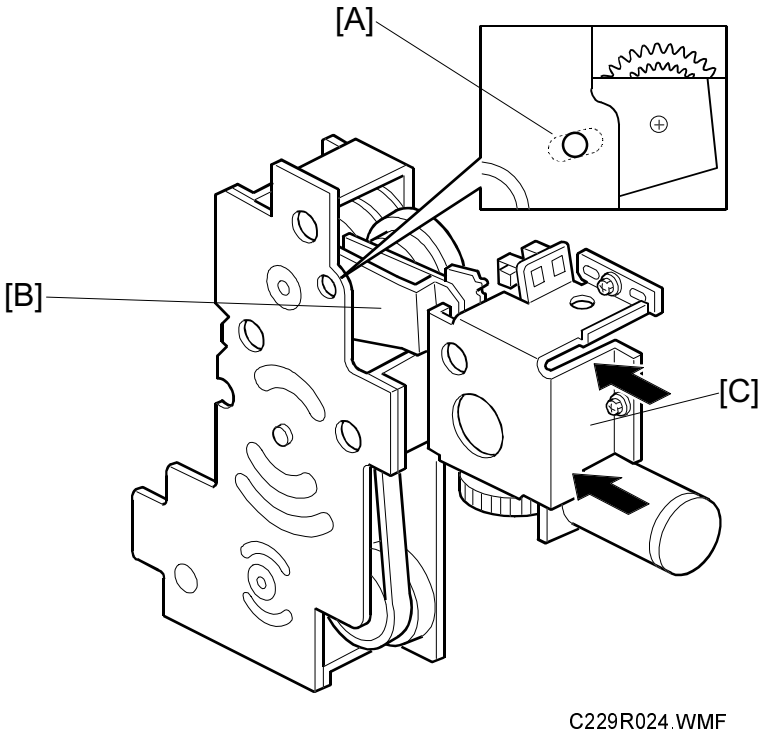


C229R027.WMF

Fully push up the worm gear [A], and push down the worm gear shaft [B]. While holding them together, secure with the 2 set screws.

6.11.6 IMAGE UP/DOWN SHIFT DRIVE UNIT POSITION ADJUSTMENT

PURPOSE: To take out any play while using the image up/down shifting function.

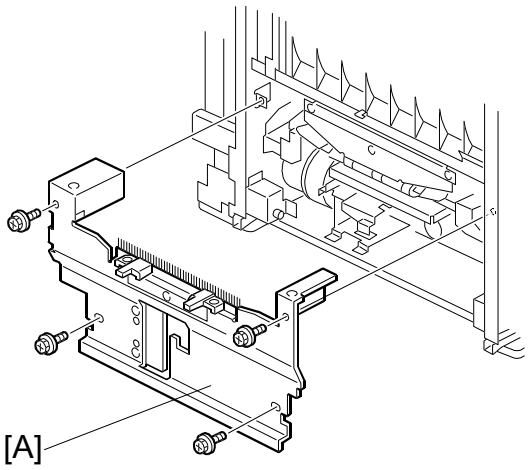


1. Set the image shift arm [B] in the home position. Align the hole in the upper plate with the elongated hole in the image shift arm [A].
2. Push the image up/down shift drive unit [C] against the image shift arm sector gear, and secure the unit (3 screws, 3 connectors).

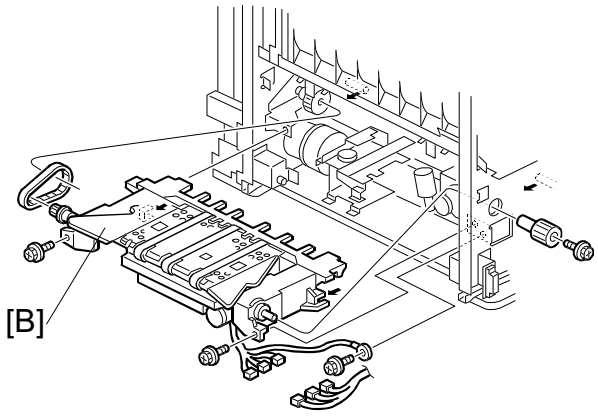
NOTE: 1) Set the arm without play in the vertical direction of the image shift arm.
2) Do not push too strongly. Check if the image shift arm moves smoothly after securing the unit. If it does not, SC05-10 will light at power on.

6.12 PAPER DELIVERY SECTION

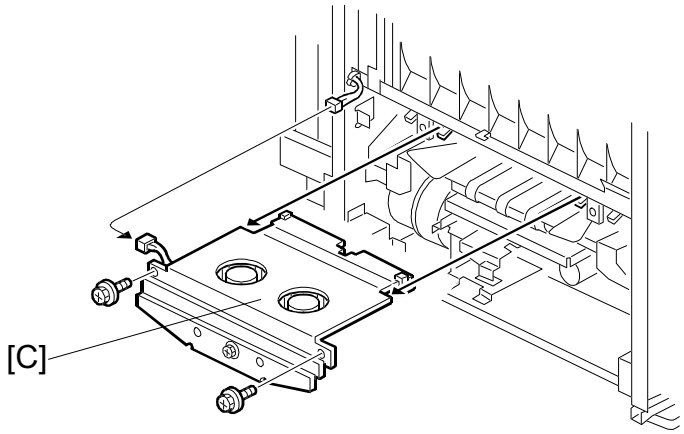
6.12.1 PAPER DELIVERY UNIT AND AIR KNIFE FAN UNIT



C229R520.WMF



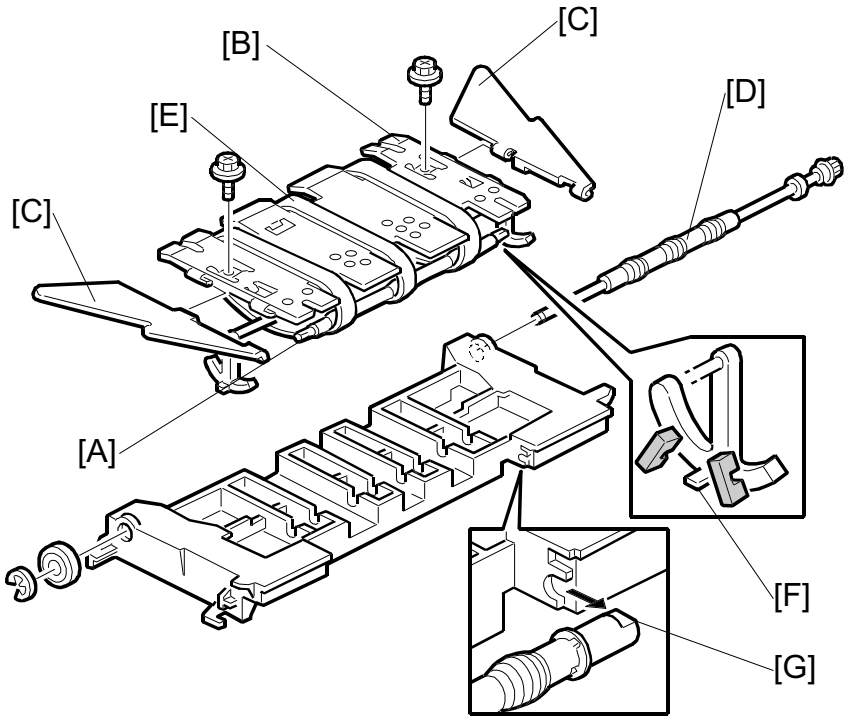
C229R515.WMF



C229R521.WMF

1. Turn off the main switch.
2. Remove the paper delivery cover [A] (4 screws).
3. Remove the paper delivery unit [B] (2 screws, 3 connectors, ground wire, knob, belt).
4. Remove the air knife fan unit [C] (2 screws, 1 connector).

6.12.2 PAPER TRANSPORT BELT REMOVAL



C229R012.WMF

First, remove the paper delivery unit (see 6.12.1 Paper Delivery Unit and Air Knife Fan Unit), then remove the paper pick-off plate from the unit (4 screws).

A: Driven roller shaft

B: Upper unit

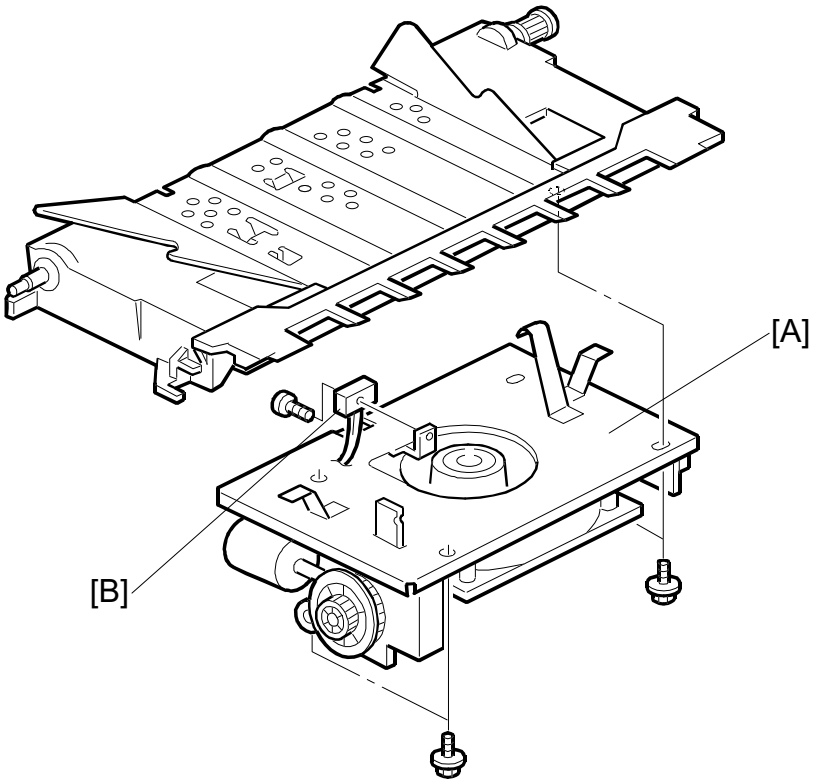
C: Paper guide wings

D: Drive roller shaft

E: Transport belts

CAUTION: 1) When reassembling, the actuator [F] for the wing upper and lower position sensors must be positioned between the sensors.
2) Both ends of the driven roller shaft [G] have a milled flat face. When reassembling, make sure that the ends are set firmly into the cutouts in the base.

6.12.3 PAPER EXIT SENSOR REMOVAL



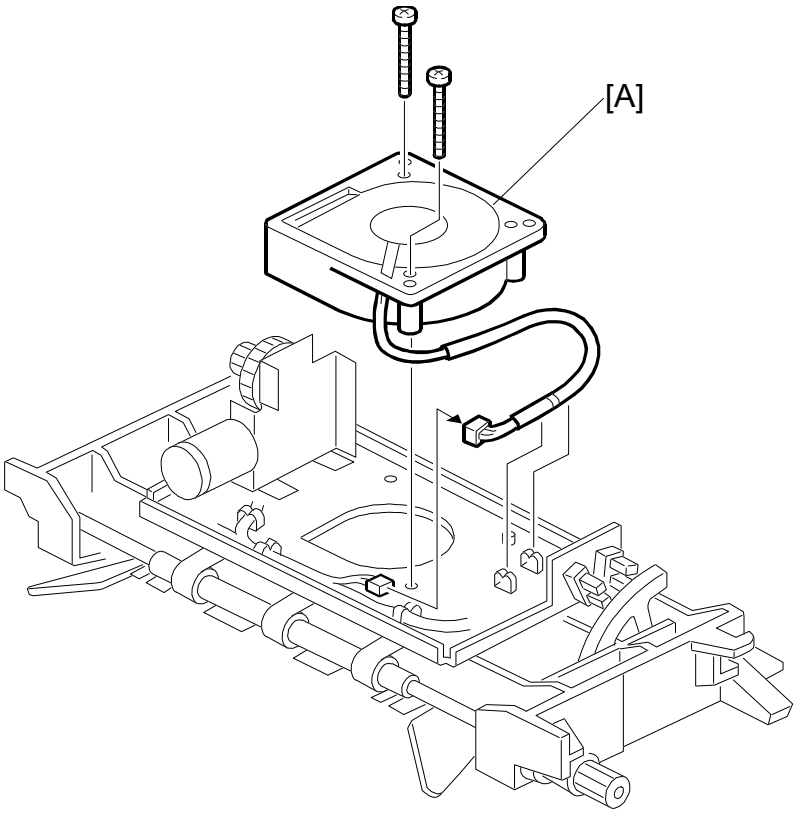
C229R013.WMF

First, remove the paper delivery unit. (See 6.12.1 Paper Delivery Unit and Air Knife Fan Unit.)

A: Vacuum fan unit (4 screws)

B: Paper exit sensor (1 screw, 1 connector)

6.12.4 VACUUM MOTOR REMOVAL

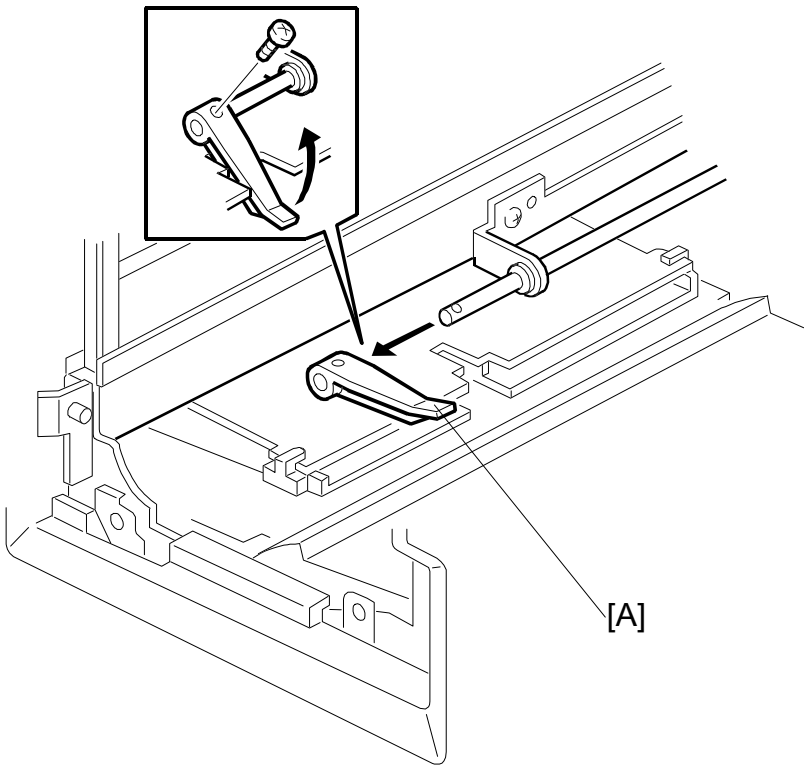


C229R518.WMF

First, remove the paper delivery unit. (See 6.12.1 Paper Delivery Unit and Air Knife Fan Unit.)

A: Vacuum motor (2 screws)

6.12.5 PAPER EXIT PAWL REMOVAL

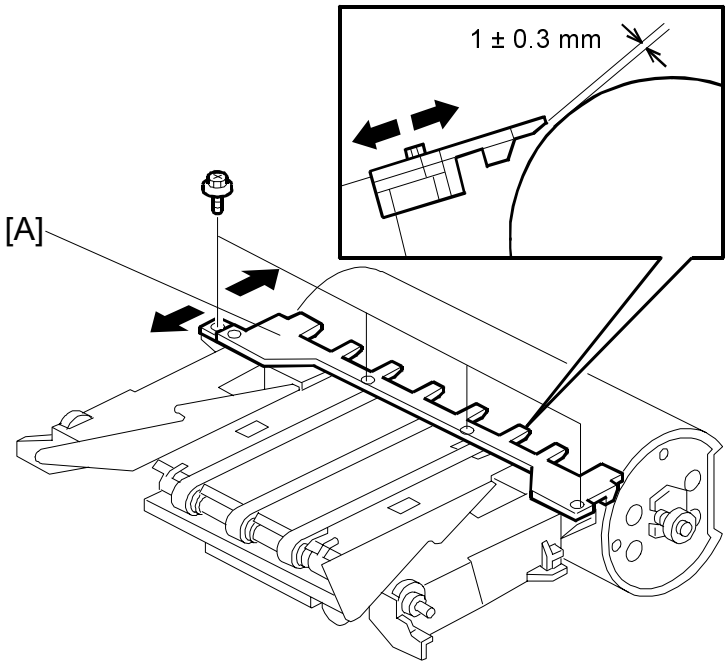


C229R519.WMF

1. Remove the drum unit.
2. Remove the paper exit pawl [A] (1 screw).

6.12.6 GAP ADJUSTMENT BETWEEN PAPER PICK-OFF PLATE AND PRESSURE CYLINDER

PURPOSE: To ensure smooth paper feed to the paper delivery unit



C229R014.WMF

1. Remove the drum.
2. Apply the printing pressure as follows. (Push the pressure cylinder up to the printing position.)

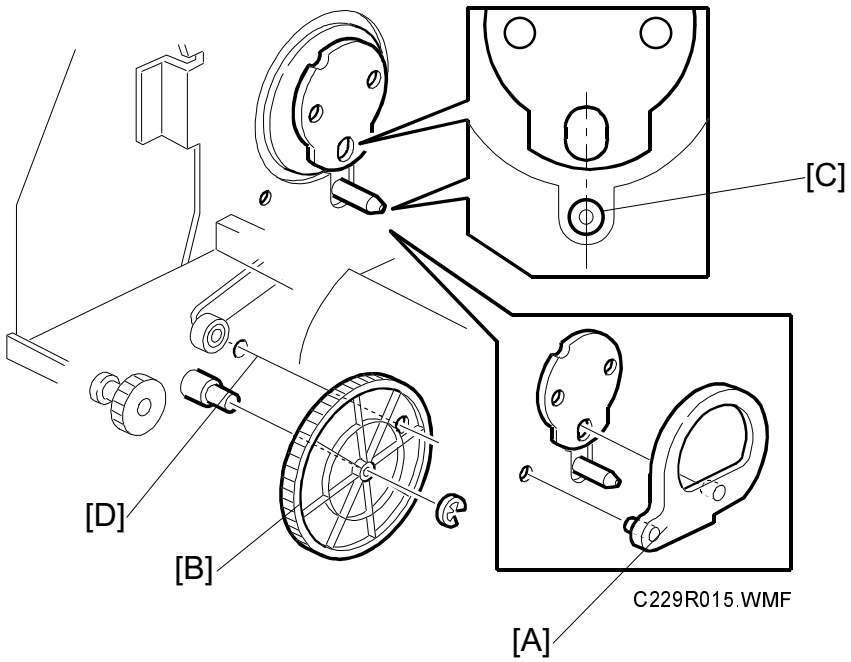
   1) Access SP 5-121, and select “ON” for the printing pressure release solenoid.
   2) While the solenoid is on, turn the cylinder half way round by hand.
   3) Leave SP mode.
3. Adjust the clearance between the paper pick-off plate [A] and the surface of the pressure cylinder until it is 1 ± 0.3 mm (loosen the 4 screws).

CAUTION: Be sure to perform this adjustment after pushing the pressure cylinder up to the printing position. If the gap is adjusted with the pressure cylinder in the non-printing position, the paper pick-off plate will damage the pressure cylinder when the printing pressure is applied and the pressure cylinder is pushed up, because the gap will be too small.

6.12.7 PAPER EXIT PAWL DRIVE TIMING ADJUSTMENT

PURPOSE: To ensure smooth paper feed, and to ensure that the exit pawl does not touch the master clamper on the drum.

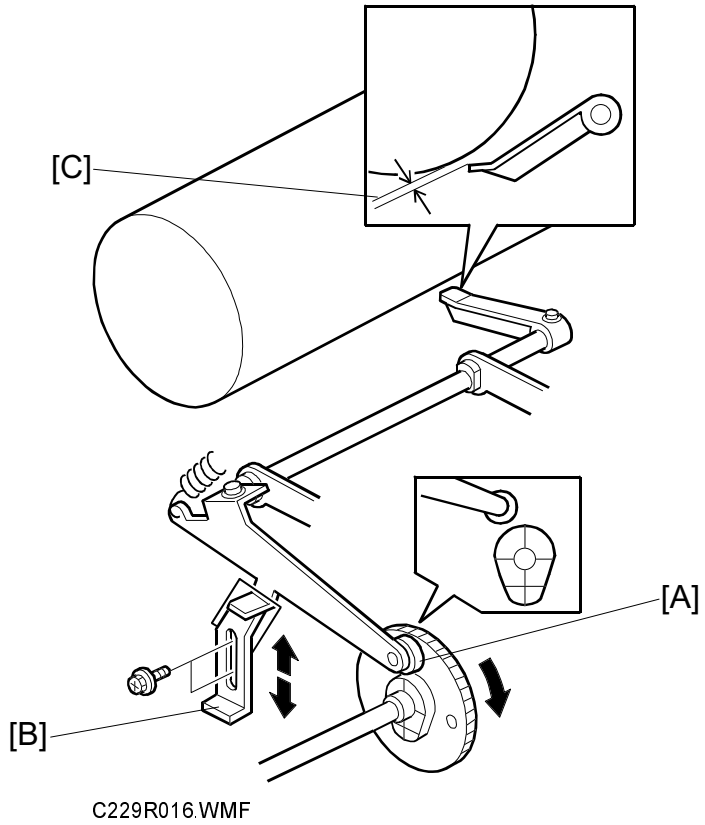
NOTE: You must adjust this after the main drive belt is replaced.



1. Remove the drum.
2. Remove the paper delivery unit. (See 6.12.1 Paper Delivery Unit and Air Knife Fan Unit.)
3. Make sure that the drum drive disk is in the home position.

   NOTE: Normally, the disk is in the home position after the drum is removed. If necessary, set the drum securing tool [A] to make sure that the drum drive disk is in the home position. (If the special tool is not available, align the long positioning hole in the drum drive disk exactly with the shaft [C] below it as shown.)
4. Make sure that the positioning holes in the rear frame and the drive gear [B] are in line as shown [D].
5. If the holes are in line, the paper exit pawl drive timing is OK. If they are not, remove the gear [B] and reinstall it so that the holes are in line.

6.12.8 GAP ADJUSTMENT BETWEEN EXIT PAWL AND DRUM



C229R016.WMF

PURPOSE: To ensure that the paper is delivered without paper wrap or damage.

1. Turn the main drive manually, so that the bearing [A] of the exit pawl arm [C] rides on the low point of the cam.

   NOTE: Use the main drive rotation knob to turn the main drive.

2. By moving the adjusting plate [B], adjust the clearance [C] between the drum and the top of the exit pawl until it becomes 1 ± 0.5 mm.

7. POINT TO POINT DIAGRAM

- Location Map
- Section A
- Section B
- Section C
- Section D
- Section E
- Section F

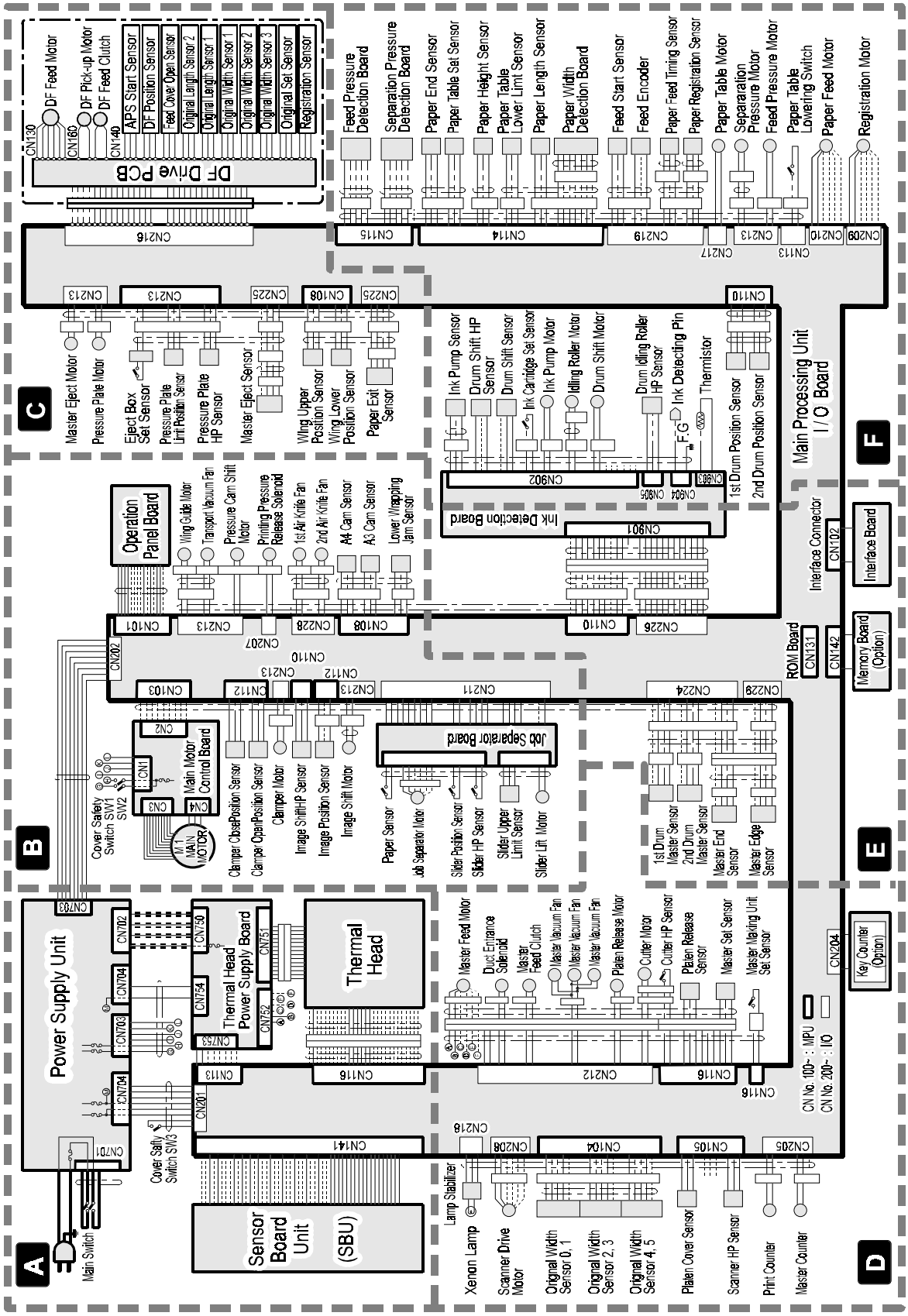
NOTE: The symbols used in the diagrams are as follows:

- SYMBOL TABLE -

———	AC Line
———	DC Line
----------	Pulse Signal Line
▷	Signal Direction
▲	Active High Signal
▼	Active Low Signal

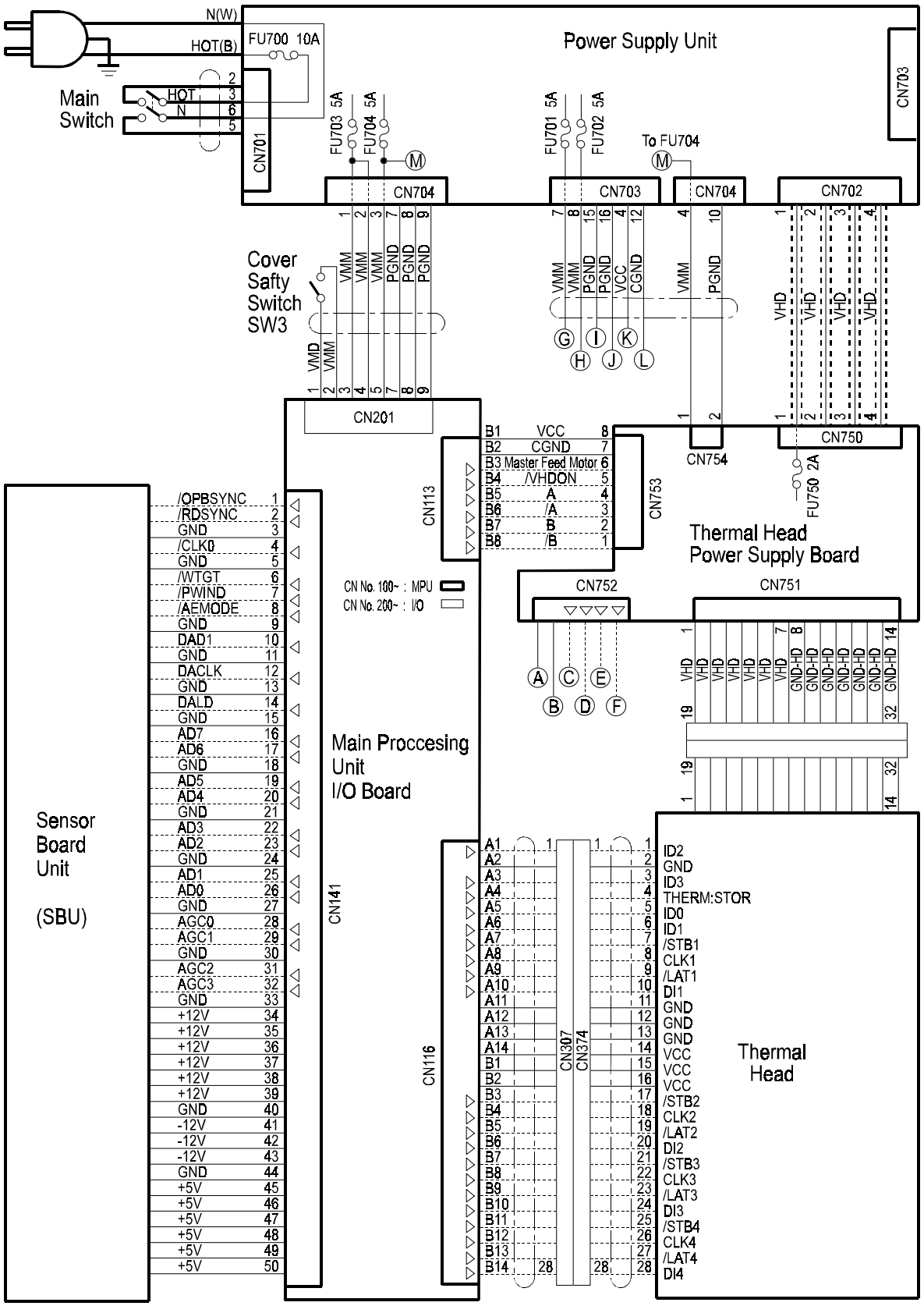
PP2.WMF

Location Map



C229S500.WMF

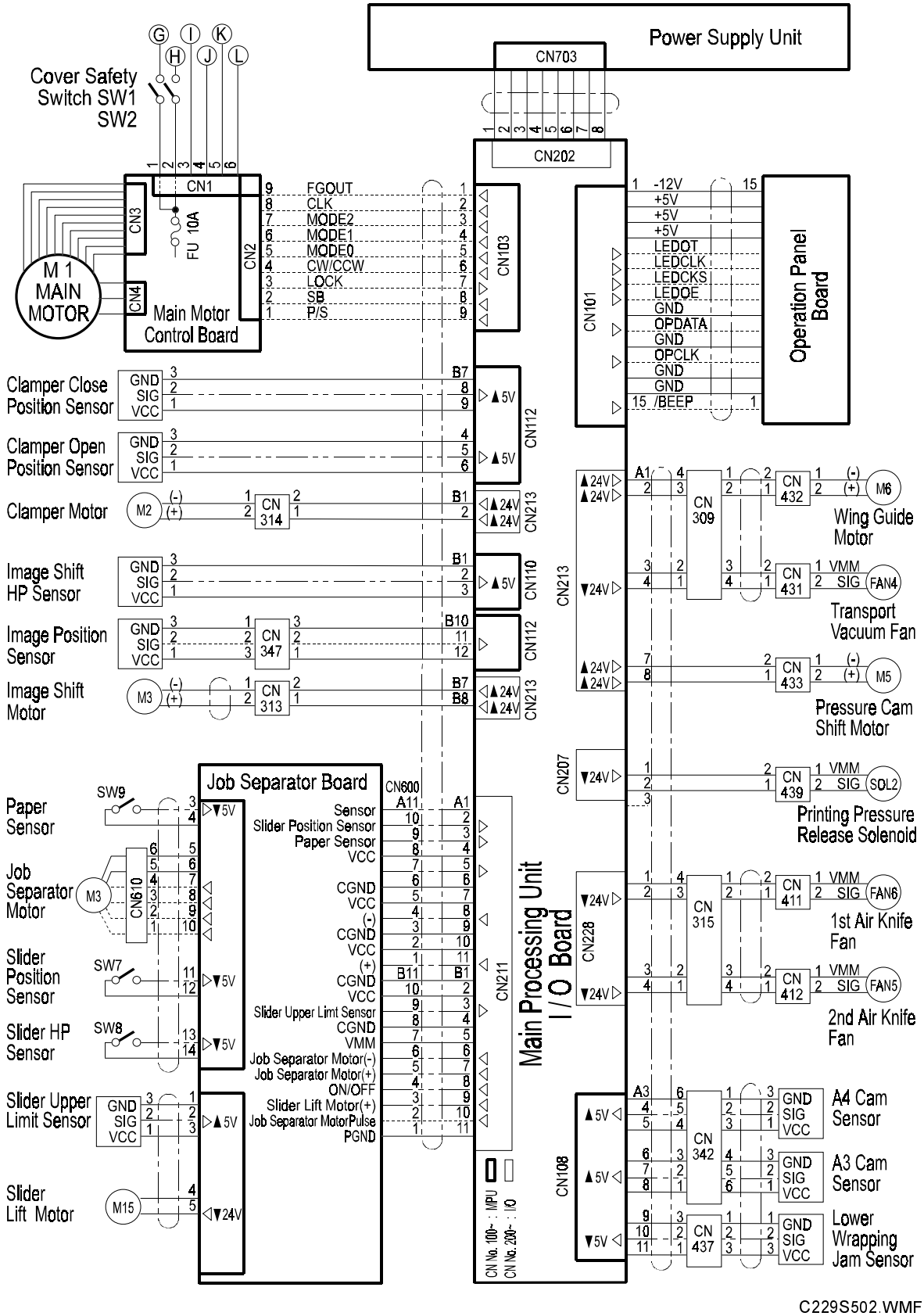
Section A



C229S501.WMF

P-to-P

Section B



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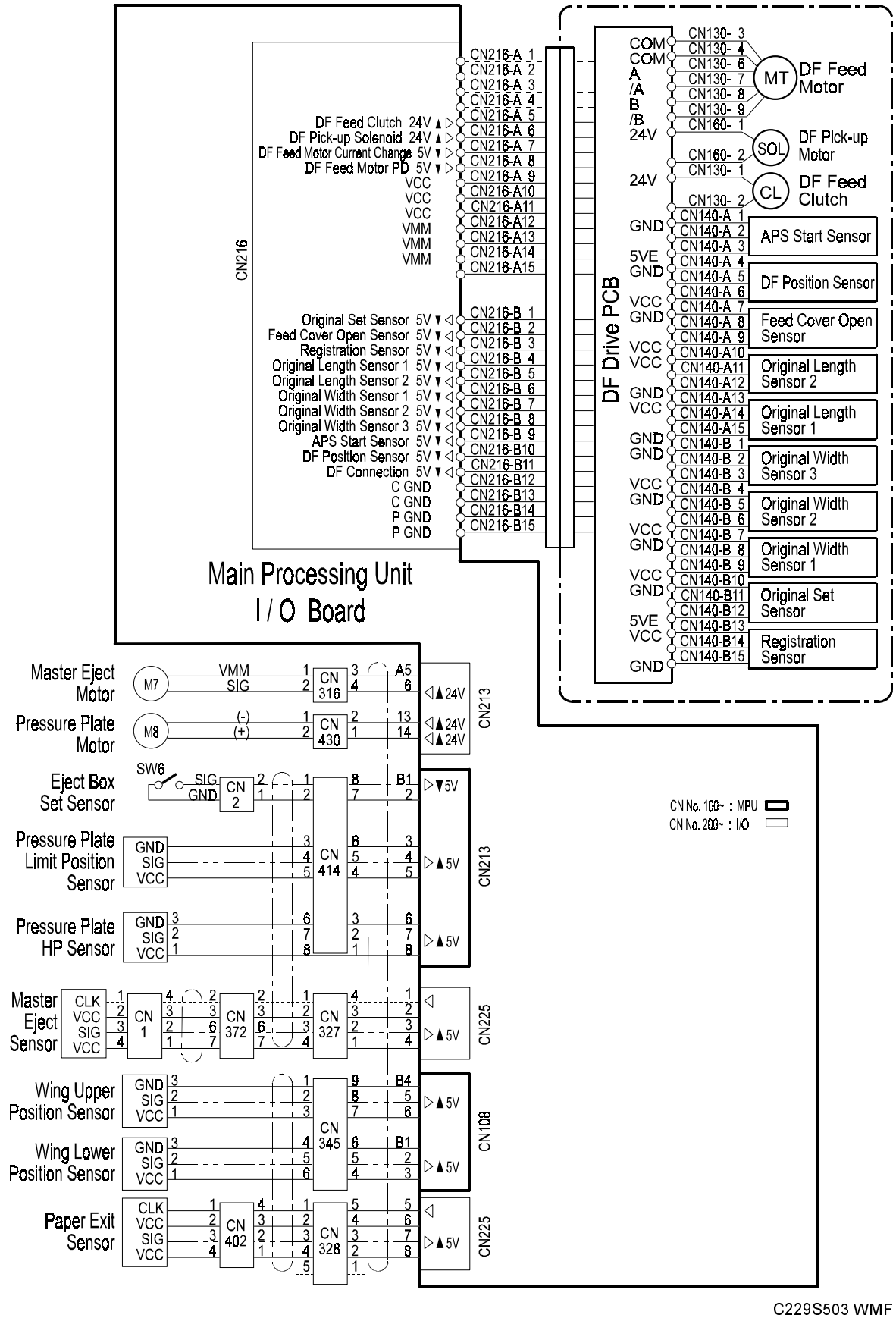
Section C



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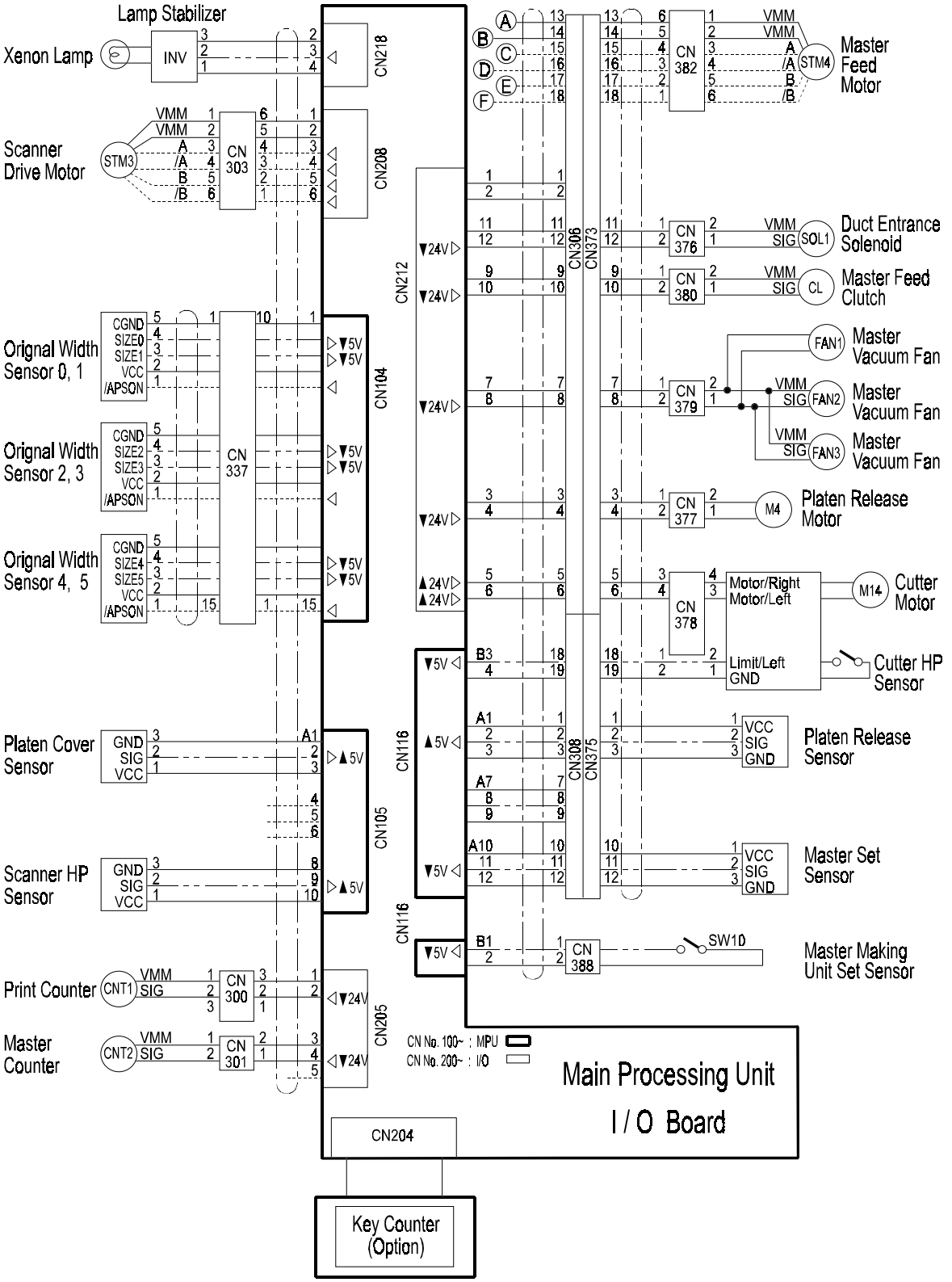

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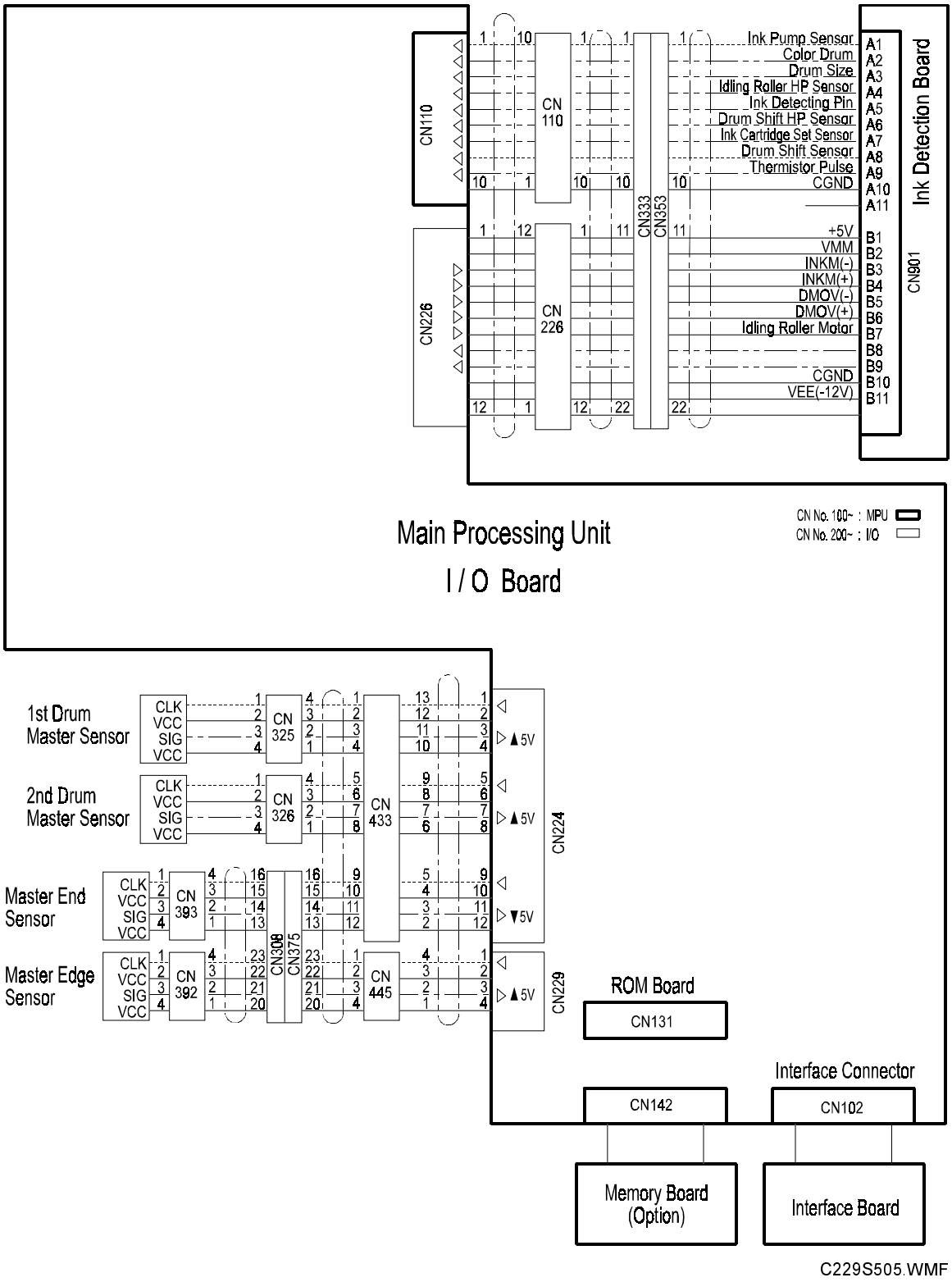

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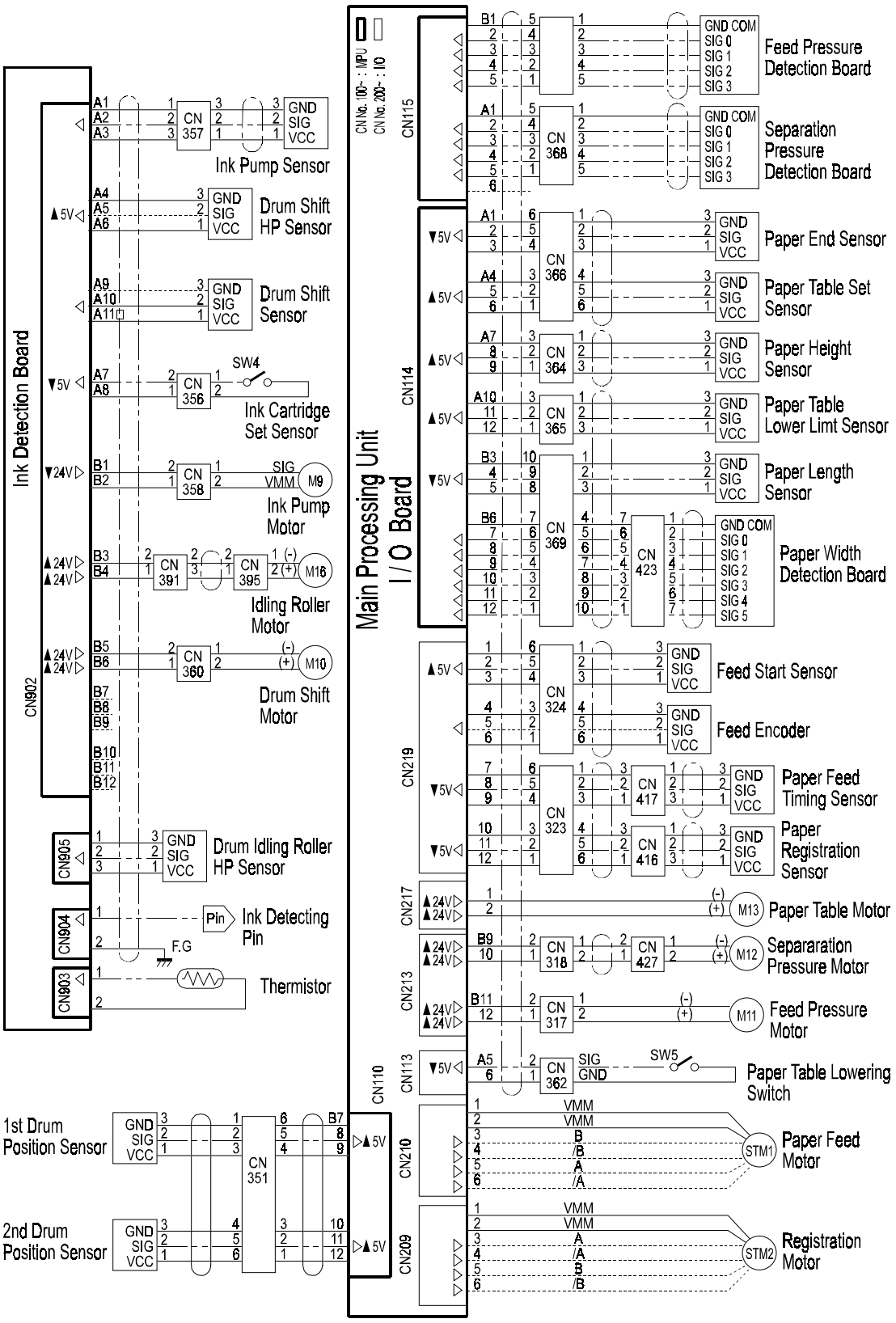

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